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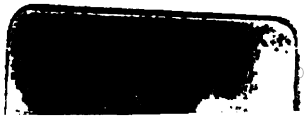

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TRANSACTIONS

OF THE

British Dental Association,

AT ITS

Seventh Annual General Meeting,

HELD IN

GLASGOW,

On THURSDAY, FRIDAY and SATURDAY,

AUGUST 18th, 19th and 20th, 1887.

REPRINTED FROM THE JOURNAL OF THE ASSOCIATION.

London:
JOHN BALE & SONS, 87-89, GREAT TITCHFIELD STREET,
OXFORD STREET, W.

1888.

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CONTENTS.

PAGE

Antiseptics in Dental Surgery, Mr. E. Lloyd Williams on ... 68

Benevolent Fund, Annual Meeting 63

" Donations to 109

Business Meeting, the 3

Campbell, Mr. W., on Water Supply with reference to Hastie Motor 33

Continuous Gum Work, Mr. J. Cumming on 40

Cunningham, Dr. G., on the Mechanical Training of Dental Student 49

" on the Dental Aspect of Public Health ... 89

Demonstrations, the 106

Dental Appointments, Mr. Gordon Jones on 46

Dublin, the Meeting at... 106

Electricity, the Application of, to Dental Uses, Mr. A. Kirby on 80

Excursion, the 107

Mechanical Training of Dental Student, Dr. G. Cunningham on 49

Members present, List of 1

Public Health, the Dental Aspect of, Dr. G. Cunningham on ... 89

Representative Board Meeting, the 2

Secretary, Report of the 10

Tomes, Sir John, Address on Resigning the Presidentship of the Representative Board 4

Water Supply with reference to the Hastie Motor, Mr. W. Campbell on 33

Williams, Mr. E. Lloyd, on Antiseptics 68

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British Dental Association.

REPORT OF PROCEEDINGS

AT THE

ANNUAL GENERAL MEETING,

HELD IN GLASGOW,

On THURSDAY, FRIDAY and SATURDAY,

August 18th, 19th and 20th, 1887.

[REPRINTED FROM THE JOURNAL OF THE ASSOCIATION.]

THE Annual General Meeting of the Association was held in the Hall of the Faculty of Physicians and Surgeons, Glasgow, on Thursday, August 18th.

Sir EDWIN SAUNDERS, President, in the chair.

There was a large attendance of members :—

Adamson, W. M., Glasgow.
Alexander, M., Liverpool.
Amoore, John, Edinburgh.
Andrew, John J., Belfast.
Ash, William H., London.

Biggs, John A., Glasgow.
Browne-Mason, Charles, Scarborough.
Browne-Mason, John T., Exeter.
Brownlie, J. R., Glasgow.
Brunton, George, Leeds.

Cameron, Donald R., Glasgow.
Cameron, James, Glasgow.
Campbell, M., Dumbarton.
Canton, F., London.
Campion, George, Manchester.
Coffin, W. H., London.
Coxon, Stephen A., Wisbech.
Crichton, John N., Perth.
Crombie, P., Aberdeen.
Cumming, James, Glasgow.
Cunningham, Geo., Cambridge.

Dall, William, Glasgow.
Dent, J. W., Stockton-on-Tees.
Durward, J. Stewart, Edinburgh.

Ewbank, F., London.

Fernald, H. P., Cheltenham.

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Finlayson, M., Edinburgh.
Forrester, W., Edinburgh.
Fothergill, John A., Darlington.
Fothergill, Wm., Darlington.
Fraser, Hugh, Greenock.

Gaddes, Thomas, London.
Gill, H. Beadnell, London and Norwood.

Hardie, W. J., Montrose.
Harrison, Richard, London.
Holland, J., London.
Hutchinson, S. J., London.
Jones, Alfred, sen., Cambridge.
Jones, Alfred, Cambridge.
Jones, W. G. Gordon, London.

King, Robt., Edinburgh.
King, Roff, Shrewsbury.
King, Thomas Edward, York.
King, W. F. H., Newark.
Kirby, Amos, Bradford.
Kluht, Henry J., Bayswater, W.

Ladyman, W., Liverpool.
Lennox, R. P., Cambridge.
Lipscomb, J. Moore, Kilmarnock.

MacGregor, Malcolm, Edinburgh.
Martin, W. F., Glasgow.
Mason, Henry B., Exeter.
McCash, James M., Glasgow.
McStay, J., Belfast.
Melville, John, Glasgow.

O'Duffy, John, Dublin.

Palethorpe, W., Birmingham.

Payling, R., Peterborough.
Pearsall, W. Booth, Dublin.
Pike, J. Lee, Sheffield.
Price, Rees, Glasgow.

Rogers, Richard, Cheltenham.
Rymer, James, London.

Saunders, Sir Edwin, London.
Sherwood, Martin, Oxford.
Shillinglaw, Wm., Birkenhead.
Sinclair, C. S., Glasgow.
Smale, Morton, London.
Smyth, Alexander, Glasgow.
Stack, R. Theodore, Dublin.
Stirling, John, Ayr.
Storey, J. Charles, Hull.

Taylor, William, Glasgow.
Thomas, H. J., Swansea.
Tomes, Charles S., London.
Turner, James Smith, London.

Vanderpant, F. J., Kingston-on-Thames.

Waite, W. H., Liverpool.
Walker, P. S., Dundee.
Wall, Charles, Dublin.
Watt, J. Ross, Leamington.
Wells, John, Berwick-on-Tweed.
Williams, E. Lloyd, London.
Williamson, W. H., Aberdeen.
Wilson, Andrew, Edinburgh.
Wood, James, Edinburgh.
Woodburn, W. S., Glasgow.
Wolfenden, A. B., Halifax.

Young, A. B., Glasgow.
Young, John C., Warrington.

Representative Board Meeting.

THE proceedings commenced as usual with the meeting of the Representative Board at nine o'clock on the morning of Thursday, August 18th, Mr. J. SMITH-TURNER in the chair. The following members of the Board were present: Sir Edwin Saunders, Messrs. S. J. Hutchinson, C. S. Tomes, Charters White, W. H. Coffin, G. Cunningham, R. Rogers, G. Brunton, R. T. Stack, W. H. Williamson, J. A. Biggs, T. E. King, W. H. Waite, H. B.

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Mason, J. R. Brownlie, Rees Price, F. Canton, and Morton Smale.

The minutes of the previous meeting having been read and confirmed,

Letters of apology for absence were announced from Messrs. Storer Bennett, R. F. H. King, T. A. Rogers, Simms and Humphrey.

The question of the Dentists' Register was considered, and it was resolved that twenty-five copies of the Register, in order of place, should be made and distributed to the secretaries of branches, with a view to each branch taking cognisance of deaths in their own districts, in order that care might be taken that death certificates might be forwarded to the medical Registrar or to the Honorary Secretary.

The PRESIDENT announced that an Irish Branch had been formed; it was affiliated to the parent society, and Mr. Pearsall, the Secretary, was admitted a member of the Board.

The chair was then taken by Sir EDWIN SAUNDERS, and a letter of resignation from Sir John Tomes as President of the Representative Board was read (see page 4) and the Secretary was requested to read it at the Annual Meeting.

Mr. SMITH TURNER was then elected President of the Board, and having resumed the chair, thanked the meeting for the confidence they had expressed in electing him to that honourable position.

Mr. Felix Weiss was chosen as Vice-president.

The annual meeting for 1888 was considered, Dublin and Birmingham having both sent invitations; it was decided to leave the selection to the General Meeting.

The list of names of the gentlemen to be elected as members of the Representative Board was considered, and it was resolved to recommend the names of certain gentlemen, and these were subsequently elected by the Annual Meeting.

The Business Meeting.

THE general meeting of members for the transaction of business was held at 10 o'clock, Sir EDWIN SAUNDERS, President of the Association, occupying the Chair.

The HON. SECRETARY (Mr. Morton Smale) stated that he had

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received letters from Mr. Storer Bennett, Mr. Alfred Hill, Mr. T. A. Rogers and Mr. R. F. H. King, regretting that they were unable to be present.

The PRESIDENT: The first business which comes before us is one which we receive with mingled feelings. It is that of the resignation of Sir John Tomes of the office of President of the Representative Board of our Association. I am afraid that we must accept this as final. He was induced last year to withdraw it for a year, but his inability to attend the meetings, as he has explained, renders him unable to hold out the prospect of any longer being President. At the same time he is quite ready on all occasions to give us his valuable advice in all cases of difficulty, and this will be invaluable to us, because no man probably is better able to advise us when any questions of difficulty arise, from his long observation and experience of everything connected with our institute, and from the singleness of purpose with which he has at all times devoted himself to the interests of the Association. I will now ask Mr. Morton Smale to read the letter of resignation from Sir John Tomes, which also contains some valuable advice for our future proceedings.

Mr. SMALE then read the address as follows:—

THE ADDRESS OF SIR JOHN TOMES ON RESIGNING THE PRESIDENTSHIP OF THE REPRESENTATIVE BOARD.

GENTLEMEN,—The time has arrived, if it has not over passed, when it becomes my duty to resign the Presidentship of the Representative Board. I have held this position of trust and of responsibility ever since the formation of the Association, and at the Cambridge meeting I accepted my re-election for a further term of three years, with the understanding that whenever the Medical Bill then contemplated by the government became law, I should resign my presidency. The Medical Act, 1886, has with its dental clauses now come into operation, and so far as can be seen, any legislation affecting the dental profession lies in the far future. So long as legal changes were undetermined, I felt that I might be able to render some service to the profession. Now that the contemplated changes have been made, there are other members of the Association who can discharge the duties of the presidentship far better than I. Indeed, those duties have for the most part been discharged very effectively and faithfully during the last three or four years by

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your hard-working Vice-president, Mr. Turner, and I have, I fear, oftentimes received credit for work he has done. For my shortcomings I can only offer the valid excuse of a state of health which is believed to require complete indoor life during the cold months. My absence from your meetings in the past has been compulsory, and there is no reason to suppose that in my now short future, similar, if not more stringent, precautions will not be prescribed, thereby rendering my attendance at your future meetings impracticable.

Hitherto my absence has not, I think, been prejudicial to the interests of the Association, but a continuation of the practice does not admit of defence. Heretofore there seemed to be special reasons why I should not vacate the chair, but these have ceased to exist, and I have no longer any excuse for allowing my name to appear as your president.

Retrospect is the province of the aged, for they alone possess the personal knowledge of passed events by the progressive occurrence of which the present position has been gained. Had any one of these events been different, the present result would have been other than it is. Very shortly few if any of us will remain who practised in the time when a reasonable amount of dental knowledge and skill was limited to a few individuals, and those were for the most part personally unknown to each other. To these survivors of an earlier state of things, the change for the better has exceeded in degree their most exalted expectations. In those days the rank and file was recruited from persons of low educational advantages and whose skill was limited to the workroom standard; now the profession is strengthened by the entrance only of persons of education and of tested skill and experience. The student when he has gained his diploma is more perfectly educated than is the member of any other profession of like standing, for during his professional education he has performed again and again all the operations and determined (under supervision) the treatment of every description of case he will in after years be called upon to treat; an advantage enjoyed by no other class of professional students.

Amazement is the feeling that takes possession of the mind, when those who have lived through and seen the great changes, think of the present state of perfection to which dental education has attained. To the younger members of the profession this may seem a strong statement, but they have not the personal

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knowledge of that which once was wherewith to compare that which now is. They have not felt the well nigh intolerable difficulties that stood in the way of obtaining an adequate amount of knowledge and skill necessary to the rightful discharge of professional duties. Difficulties which, by the very weight of their pressure, induced the reformatory efforts which, steadily pursued through a generation, have brought us to our present prosperous position. Aided by the legislature the progress has been continuous and by no means slow. The dental charter granted to the Royal College of Surgeons of England may be taken as the foundation stone of the preconceived structure, the beneficial working of which made the Dentists Act an achievable result. No reasonable person can doubt that both charter and Act have been in the highest degree useful and even necessary to the development of dental surgery as it is now known and practised in this country.

That each has imperfections needs no saying, for it is not in the power of man to foresee and guard against all possible contingencies. But the defects are limited to minor and relatively unimportant provisions, such as will be cured by the mere lapse of time alone, while other so-called defects are faults (perhaps not at the time wholly avoidable), in the construction put upon the phrases of the Act by the Executive. One of these faults has been pointed out by the Master of the Rolls, and concurred in by the Lords Justices at the Court of Appeal. The educational provisions and the rules for the subsequent registration of the licentiates, constitute the substance and meaning of the Act. The penal clauses are of inferior importance, for the educated always have it in their power to surpass the uneducated in the pursuit of any subject requiring the exercise of knowledge and skill. The examination of apparently exceptional cases will generally reveal disastrous errors on the part of those whose success lay in their own hands; and the success of charlatans is very generally much over-rated by those who complain of their presence as competitors for practice. We should be stupid indeed if we could not profit by experience, and those who were actively concerned in framing the Dentists Act would—were the opportunity to recur—amend some of the minor details. The critic is often a non-constructive person who assumes a position of unproven superiority when he challenges defects in work he has taken little or no part in producing.

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Judged from the standpoint of results, the Dentists Act has to my mind been a great success. Who can justly say that the educational results have not been in the highest degree beneficial to the public and the profession? and it will, in respect to fulfilling its purpose, compare favourably with any other educational Act. Furthermore, it requires that a list of the qualified, with a statement of the character of their qualifications, shall be printed each year, and provides also for the ready punishment of persons who pretend to the possession of such qualifications not having them. Beyond this Parliament firmly declines to go. The utmost limit in the way of protection to which the legislature will give its sanction has been, I believe, reached in our Act; and, if we were made the judges of the extent to which protection should be given to a profession not our own, I feel sure that we should not extend the limit beyond the line drawn by government for the protection of the dental profession.

Parliament has drawn a hard line separating the qualified from the unqualified, over which it will not allow the latter to pass. The penal clauses of the Medical Act of 1858 are much less clearly stated, and much less stringent than are the corresponding clauses of the Dentists Act. Yet the promoters of the Medical Act, 1886, were unable to introduce clauses of greater stringency for the remedy of an acknowledged defect. In my opinion we shall exercise good sense by abandoning all thoughts of attempting the gain of greater penal powers, and by working with liberality of purpose within the lines of our sufficient Act.

Before concluding I wish to offer to the Board my sincere thanks for the uniform support I have received from its members, and for the great personal kindness with which I have been at all times and by one and all treated. To Mr. Turner I desire on this occasion, and in your presence, to express my gratitude for the ever willing help he has rendered me in the discharge of my duties, frequently doing work which rightly should have been done by me, and for the doing of which I have received the credit really due to him. I owe to him a life-long debt of gratitude, a debt I cannot discharge. It has been my earnest endeavour, and I trust I have not been wholly unsuccessful, to conduct the business of the presidentship with strictly even handed justice to all parties interested, and with especial regard to the interests of the profession taken as a whole. If at any time personal considerations may seem to have had some influence they must have operated

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by misadventure, for most certainly I have endeavoured to my utmost to resist such influences, whenever the common interest was concerned. I have often been absent from your meetings, not willingly, but because I could not help it, because the state of my health during the last few years has obliged me to keep the house in cold or doubtful weather. I may once more well ask your forgiveness for this oft-condoned fault. I resign my position as an active member of your body with strong feelings both of regret and of gratification; I regret that the time has come when I can no longer pursue with energy and confidence in your midst, the line of action leading to the advancement in knowledge and skill, and to the maintenance of the honour of our useful calling. But I am grateful to have lived through a time when so much good work has been done, and to have lent a willing hand in the doing of it.

So long as I may live I shall be ever glad to do all in my power in the interests of the profession, the practice of which has enabled me to spend these latter and poorer days of life, if not in affluence, yet in ease. Any counsel I may give or opinion I may in the future offer must be taken for what it is worth, divesting it of all personality, and before any action is taken thereon it must have become the opinion or counsel of those who take upon themselves the responsibility of action, for they, not I, must be answerable for the results.

My professional career now comes to an end, and, as your President, I bid you farewell.

Sir Edwin Saunders (the President): Gentlemen,—I am quite sure we did wisely in allowing this farewell address, with all its pathos, its sincerity, its disinterestedness, and its tenderness of recollection to be placed before you. Although it was strictly addressed to the Representative Board, I am quite sure that in listening to this address we feel that we should not do wisely to ask Sir John Tomes any longer to continue the position which he is desirous of resigning, and we are glad to know that since his recent severe illness he is really in a satisfactory state of health, only that it is necessary that he should be extremely careful of himself, and we know that as long as he lives his heart will be with us, and he will sympathise in all that we do, and all that happens to us. I trust that you will accept a resolution which I have worded, subject to any emendation that you should think proper to suggest, which runs as follows:—"That this meeting, while accepting with great

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reluctance the resignation of Sir John Tomes as President of the Representative Board of the British Dental Association, desires to record its deep sense of the value of his services in the cause of dental reform and professional organisation, and especially of his vigilance during the long period of impending legislation in medical matters, which has resulted in securing a full recognition and place for dental surgery in the recent, and probably final, Medical Amendment Act of 1886."

Mr. SMITH TURNER: Sir Edwin Saunders and gentlemen, I think the resolution which has been placed before you is so all-sufficient and comprehensive that I need scarcely say one word in support of it further than bearing my testimony to the description which it gives of Sir John Tomes' services to the profession. I have had the honour and pleasure of working intimately and personally with Sir John Tomes for over twelve years, and I believe that if I have expended a great deal of strength and time I have been the gainer, for, to associate intimately with such a man as Sir John Tomes, especially in delicate business matters, is of itself a valuable education. I have great satisfaction in being allowed to second this vote of thanks to Sir John Tomes, which has been placed before you by our President.

Mr. WAITE (Liverpool): I should like to be allowed to add one word, as representing in some sense those living in the provinces, in support of the resolution which the President has proposed, and which Mr. Turner has seconded. Sir John Tomes has commanded universal confidence throughout the profession, which can only be the product of long experience and wisdom, and judicious conduct of our affairs. He carries with him into his retirement the satisfaction of having accomplished reforms that will last for generations in the interest of dentistry, and still further, the testimony of a good conscience that he has done what he could on behalf of those in whose interests he laboured. I have great pleasure in supporting this motion.

The motion was then put to the meeting, and unanimously agreed to.

The PRESIDENT: The vacancy caused by Sir John's resignation has been filled by the Representative Board electing the Vice-President, Mr. Turner, for this office. I think I may take those cheers as a distinct approval of the action of the board in that matter. To fill the vacancy thus caused in the Vice-Presidentship, Mr. Weiss, a gentleman favourably known to us, who

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represents perhaps another section of the profession, and who is distinguished alike for his literary ability and for his large experience in professional matters, has been elected to succeed Mr. Turner in the Vice-Presidentship.

Mr. CANTON (the Hon. Treasurer): Sir Edwin and gentlemen, I am sure we shall all deeply regret the resignation of Mr. James Parkinson as Treasurer, more especially as the cause of his resignation was ill-health, and I trust that this meeting will sympathise with him in the state of his health. I have to state that there are about 180 members in arrears in subscription for one year, and nineteen for two years. Our balance at the bank is £589 16s. 2d. I should like to see the subscriptions paid up more regularly than they are, and a very easy way for doing that is to give an order on your bankers, and to pay the amount at the beginning of each year. I am glad to report that a few of those members whose names were obliged to be removed for non-payment have paid up their arrears and again joined us. That is what we always hoped would be the case.

The adoption of the Treasurer's report was moved by Mr. BROWNE-MASON, and seconded by Mr. ROGERS, and carried.

The HON. SECRETARY then read his report as follows:—

GENTLEMEN,—Your executive have much pleasure in placing before you an annual report, not entirely devoid of interest, of the work of the Association, under the able Presidency of Sir Edwin Saunders.

Again we have to report the formation of a new branch. Ireland has come to the front and asked to be affiliated to the parent society. To Dr. Stack is due great praise and many thanks for his enthusiasm on behalf of the Association, for to him we owe entirely the formation of this branch. To our worthy Vice-President, of course, we are indebted, for he at great personal inconvenience went to Ireland to assist in inaugurating our new accession. The other branches have done much towards making the year a useful and successful one, by the meetings they have held, where important papers have been read and discussed. After one such meeting your executive felt it necessary to severely criticise a presidential address; they venture to hope that in so doing they were fulfilling the wish of the collective members of the Association.

One name has been removed from the Register at the instigation of the Board, he having been fraudulently registered.

A case which has been considered very fully at various times,

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both by your Board and Business Committee, has recently occupied a very public position, and although it has been again successfully contested against the Medical Council, the Master of the Rolls, in his summing up, pointed out a course at once dignified and efficacious for the removal of individuals so implicated from the Register; it is hoped that the Council may see its way to act on his suggestion.

At both Manchester and York the Representative Board has been successful in preventing the exhibition of dental specimens.

The question of the Dental Register is occupying much time and consideration of your Board and Business Committee; with a little united action on the part of both members and executive, it is hoped that a perceptible improvement may be found in the issue of 1888. The omission of some dentists to register at the time when they receive their qualification is a matter of grave regret; it is hoped that the younger men of the profession will do their best to further its interest by at once placing themselves upon the Register.

The papers read by Messrs. Cunningham and Fisher have been published, with a preface by Sir John Tomes; a copy of which will be found in the last issue of the Journal, and circulated amongst the executive of the Army, Navy, and Civil Service.

Mr. Arthur Underwood continues to merit the praise of the Association for the able manner in which he discharges the duties of sub-editor of the Journal.

The numerical strength of the Association continues to increase; the number of members last year was 607, while to-day it is 645, showing an increase of thirty-eight, but only nine were removed for non-payment at the end of last year, against sixteen in the year previously; there has been only one resignation against six, and two deaths; one of the deceased was a familiar face at our annual gatherings and a member of the Representative Board—Mr. Mahonie, of Sheffield; the actual number of new members, therefore, during the year, is fifty against sixty-nine last year. It behoves us to see that the lessened increase is only due to the fact, that most of the reputable members of the profession are already members of the Association, and to endeavour to impress the younger members of the profession with the importance of joining our ranks.

Your executive has to report several official resignations, viz.:

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Sir John Tomes, President of the Representative Board; Mr. James Parkinson, Treasurer; Mr. F. Canton, Secretary; Mr. T. A. Rogers for the Representative Board. In the place of Sir John Tomes your Board has, to-day, elected Mr. J. Smith Turner its President, an appointment that must meet with the entire approval of the Association; in Mr. Turner's place as Vice-President, Mr. F. Weiss has been elected.

The Treasurership, vacated by Mr. Parkinson, has been temporarily filled by Mr. Canton, and it will be for you to-day to confirm or cancel, this appointment. Mr. Morton Smale has been selected to fill the position formerly occupied by Mr. Canton.

Mr. T. A. Rogers, a name that is almost a household word in the dental profession, finds it impossible to continue his services as a member of the Representative Board, and another gentleman must be elected in his place.

To all these gentlemen more than our thanks are due, yet that is all we have to give; let the thanks, therefore, be unanimous and hearty, for services such as these gentlemen have rendered their profession are rare indeed.

Dr. Stack: Mr. Chairman and gentlemen, I rise to move the adoption of the report, which I think you will agree with me is an exceedingly satisfactory one. The large increase in the number of members is really in itself sufficiently gratifying, and I may say here that I have the name in my pocket of another gentleman not included in the report, who is virtually now a member of the Association. I must deprecate Mr. Smale's very kind allusion to myself in the formation of the Irish branch. I feel that I did the very best I could, but there were other workers in the field who did quite as much, if not more. Mr. Arthur Baker, who is not here, gave the greatest possible help, and Mr. Pearsall, who has attended this meeting at great inconvenience, gave us the greatest help in the matter of smoothing over the initial perils that one experiences, as did also Mr. John O'Duffy. I am happy to say that we appear before you as a united branch with a united purpose.

Mr. Gordon Jones, after making some remarks on the mode of filling up vacancies on the Representative Board, which were ruled to be out of order, seconded the adoption of the report, which was put to the meeting and carried unanimously.

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The PRESIDENT: The next question we have to consider is where we shall meet in 1888. Two places have been put forward. A long-standing claim has been made for Birmingham. I believe as long back as the meeting in Edinburgh, Birmingham received a sort of promise that the next meeting should be held there; but since then there has been a very urgent claim from Dublin, and it will be for this meeting to decide which of those places shall have the preference.

Mr. PEARSALL (Dublin): On behalf of the newly-established branch in Ireland, I have come forward here to-day to offer you our heartiest welcome, and to express the hope that you will come to Dublin for the next meeting. It may, perhaps, seem rather presumptuous on our part to come forward so rapidly, but the fact is that we have a great many gentlemen in Dublin who have always held a good social position as dentists, and I think we have opportunities of holding a very successful meeting. We can have the use of good buildings, and I think you may be certain of a hearty welcome. The members of our branch have expressed a great anxiety that this meeting should be held in Dublin, and they are willing to work like one man to make it not only a success socially, but a success professionally. I beg to move that the meeting be held in Dublin next August.

Mr. JAMES CAMERON (Glasgow): I beg to second that.

Mr. A. KIRBY (Bedford): I am not at all interested in Birmingham, but as the greatest number of members reside in England, I think the meeting should be held in England, and I beg to propose that the next meeting be held in Birmingham.

Mr. PALETHORPE (Birmingham): I beg to second that. The Birmingham men have sent me to say that they are thoroughly in earnest in offering this invitation, and that if you accept it they will do their very best to give you a hearty welcome. I believe we have a prior claim, having invited you once or twice before, and we sincerely hope that you will give our town the honour.

A discussion ensued in course of which the respective claims of the two cities were set forth by the different speakers. The general impression appeared to be that, while Birmingham had a certain precedence in point of time, the claim of Dublin was (as both Mr. Rees-Price and Mr. Cunningham pointed out) something of a national claim, and therefore superior to that of the city in the Midlands, which represented simply a branch of the Association in England. Moreover, it appeared highly desirable

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to do anything that would tend to strengthen the newly-formed branch. When the matter was put to the vote, twenty-six voted for Birmingham and twenty-nine for Dublin. It was then agreed that the Association should meet in Dublin on the 23rd, 24th, and 25th of August, 1888.

The PRESIDENT: We now come to the question of President. I am instructed to state that the Representative Board recommend for your adoption the name of Mr. Daniel Corbett, the President of the Irish branch.

Mr. MARTIN SHERWOOD (Oxford): I beg to propose that Mr. Daniel Corbett be the President-elect of the Association. I have known Mr. Corbett for a great many years, and I was a pupil of his ten or twelve years ago. I know the sterling qualities of the man, and the untiring energy which he has always displayed, and he has been very useful in forming the branch in Dublin. I therefore beg to move that he be appointed President-elect.

Mr. JOHN O'DUFFY (Dublin): I have very great pleasure in seconding that resolution.

The PRESIDENT: The Representative Board have elected Mr. Canton as Treasurer *pro tem.* Mr. Canton was for some years Secretary, and it is for you to consider whether you confirm that election.

Mr. S. J. HUTCHINSON: I beg to propose that Mr. Canton be elected Treasurer of the British Dental Association. During the time that he filled the office of Secretary he discharged the duties with thorough efficiency. Perhaps you will permit me to include in this proposition a vote of thanks to the retiring Treasurer. It is a very easy task for me to propose a vote of thanks to Mr. Parkinson, because I have the most intimate acquaintance with him, and every year has added to the esteem with which I first approached him, and I know that that feeling is shared by all the Association. I hope that you will give him your very hearty thanks for his untiring unstinted efforts. He never spared himself with any duty to fill the high responsibility of his office as Treasurer, and in appointing Mr. Canton I ask you to accord your heartfelt thanks to Mr. Parkinson for the service he rendered to the Association.

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Mr. SMITH TURNER: I have much pleasure in seconding Mr. Hutchinson's motion that Mr. Canton be elected Treasurer. I have seen some of his ability in that direction already, and I know that in Mr. Canton you will have something like a skilled actuary keeping the accounts. We all know and miss the familiar face of Mr. Parkinson. It seems to me that it reminds some of us that we are getting on, when we have to go through this long array of votes of thanks to men retiring and others taking their places, and it is satisfactory to know that the Asssociation with its age is making progress. Although we shall miss the face of James Parkinson for some time, yet, as Mr. Hutchinson says, we must not allow his name to fade from our memory.

Mr. CANTON returned thanks for his election.

Mr. SMALE: The election of the members of the Representative Board now comes before you, gentlemen, and there are five senior members of the Representative Board for London to go off by rotation, in addition to which my own name and the names of Mr. F. Weiss and Mr. T. A. Rogers come off, which allows us to have eight new members for London. The Board recommend that we should elect as these eight members—Sir Edwin Saunders, Sir John Tomes, Messrs. Storer Bennett, S. J. Hutchinson, Charles Tomes, Lloyd Williams, Charles West, and Leonard Matheson. These have to be signed by six members of the Association. With regard to the provinces, five members come off—the five first names. Mr. Mahonie, of Sheffield, has died, and Mr. Brownlie has been elected President of his branch, and therefore becomes *ex officio* a member of the Board. The following names have been put forward—Messrs. George Cunningham, Fenn Cole, W. A. Hunt, T. Cooke-Parsons, Blandy, Pike, and W. S. Woodburn.

The PRESIDENT: Gentlemen, I am happy to tell you that the result of the election has been unanimous in favour of those members proposed by the Representative Board. I need not read their names again. There is only one that I should take exception to—one who is disqualified by old age—that is myself. But I am willing to stand for another year, and I will claim your indulgence and will do my duty to the best of my ability. I only

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state that the number of members elected by the Representative Board are also elected to fill the vacancies among the country members.

Mr. WOODBURN (Glasgow) proposed, and Mr. REES-PRICE seconded, a vote of thanks to the Faculty of Physicians and Surgeons, of Glasgow, for the use of the Faculty Hall, and also to the managers of the Dental Hospital of Glasgow.

Mr. BIGGS: I beg to move a very hearty vote of thanks to the working members of the Representative Board. They have had a very great deal of work to perform throughout the year, and I think it is the duty of the members of this Association to express their appreciation of it by giving them a very hearty vote of thanks at this time.

Mr. ANDREW (Belfast): I beg to second that.

Mr. SMITH TURNER: In the name of the Representative Board I beg to thank you for your vote of thanks for the work we have done, and I presume we may take it also as a vote of confidence in our willingness to serve you. I hope, therefore, that a great deal of the vote of thanks should go to the provincial members, because many of these men come very long distances—some of them rarely missing a Board meeting. We have instances of such a man as Mr. McLeod, of Edinburgh, who comes a long journey to attend the Representative Board, and we have other members who come from Dublin, and Mr. Waite is continually up with us from Liverpool, and others come very long distances. I think when you consider the sacrifice of time that this involves, you will agree with me in saying that the biggest share of the vote of thanks should go to them, but in the name of the Board I thank you for the way you have expressed your confidence in us.

The President then delivered his valedictory address, as follows:—

GENTLEMEN,—The circling year has again brought round the very agreeable time for the annual re-union of the members of the British Dental Association. Another year has passed, another of those natural and convenient divisions of time, by which, and by the changing seasons contained therein, the short span of human existence is measured. A space of time which is of various value to each of us, and is long or short according to age, temperament,

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or, above all, as it is full or void of interesting events. As Rosalind says in the charming pastoral play of "As You Like It," "Time travels in divers paces with divers persons; I will tell you who Time ambles withal, who time trots withal, who time gallops withal, and who he stands still withal." To the young amongst us who are buckling on their armour, and who are jubilant in the first flush of healthy manhood, how insignificant a portion of time does it seem out of the affluence of the years of which they are presumably the heirs! While to those of us who have more than passed the grand climacteric, a year means the subtraction of a very large amount from the short remainder of life to which we may regard ourselves as having a possible or legitimate claim. Life is here, as it were, viewed through the large and small end of the telescope by those commencing their career and by those approaching its close; a difference as great and as real as that between the roseate and hopeful anticipations of the future indulged in by the sanguine and the gloomy prognostications of one of pessimistic proclivities. Again, how unspeakably dull and weary are the hours of a tedious convalescence when we are cut off from active participation in the affairs of life, and are forbidden earnest and consecutive thought on any serious subject. In the first onset of sickness the enfeebled patient yields a ready acquiescence in the dicta of the autocrat of the sick room, but with slowly returning strength, his no longer patient spirit rebels against what he regards as the negation of existence. He chafes under the unaccustomed restrictions and limitations of his maimed life, his soul hungers and thirsts for a resumption of his former duties and pursuits, and he burns with an insatiable longing again to enter the arena of his former busy life. Or which of us has not felt during a well-planned and successful holiday, how far away in the past seems the routine life from which he has temporarily escaped; how his days seem to be multiplied and his spirit enlarged by the novel and unwonted aspects of nature, or by the marvels and triumphs of art that on every side charm his enraptured eye? And I feel sure that it will be in accordance with the experience of the members of this Association, or at least of such of them as are qualified to form an opinion from having made the experiment, that occasional absences on foreign travel are of the greatest service to those engaged in the active practice of the profession, by enlarging the intellectual outlook, raising the standard of artistic taste, and thus of counteracting the narrowing and benumbing

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tendencies of a somewhat barren and engrossing speciality—when, in short, they will be brought to feel the full force of that fine saying of Schiller, "Man grows greater with his greater aims." For however firmly convinced we may feel that the mitigation of pain and the renovation of faulty organization is a useful and highly meritorious pursuit, and not without dignity even when carried out in a right spirit; yet there will be moments when the most enthusiastic practitioner of dentistry must be aware that a life will be wanting in charm which is devoted to the unrelieved monotony of routine practice. I will indulge, then, the hope that since we last met the members of this Association have had opportunity of availing themselves of this much-needed refreshment of mind and body, and that the renewed health and efficiency thus obtained have not only been of advantage to those on whom their skill has been expended, but have resulted in increased comfort, progress, and prosperity to themselves.

But the question of greatest moment to us is, what has been the effect of the past year on our Association? What is the record of its work and to what extent has it fulfilled its purpose? Has it satisfied or fallen short of the expectations of the profession, in whose interests it was established? I cannot help thinking that the report to which we have just listened gives a very satisfactory answer to these questions. This phenomenal year, which has witnessed an unparalleled outburst of patriotism and loyalty; this jubilee year when we are alternately filled with amazement at the fervour of attachment of all classes and conditions to the personality of the Sovereign, and at the benignity of nature in the unwonted affluence of sunshine with which our beloved fatherland has been favoured; will be remembered by the members of the Association as having been signalised by the formation of the Irish branch. This gratifying event, the consummation of which is greatly due to the prompt action of Mr. Smith Turner, Vice-Chairman of the Representative Board, whose energy and unselfish devotion to duty have been displayed on many similar occasions, will, I feel sure, be regarded as a matter of sincere congratulation on both sides. To the Association it means an undoubted accession of strength, not only by the augmented number of members, but by the social position of the gentlemen by whom our profession has been so well represented in the sister isle, and for them we hope and believe it will be productive of freer intercourse, warmer friendships, more liberal judgments of each other, greater

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dignity and prestige, with a higher estimation of the profession on the part of the general and medical public, and all the social gifts and privileges that spring from united action for the common good. Even so does "Man grow greater with his greater aims." I will, then, cherish the hope that the London meeting of 1886-7, both as to the number and importance of the papers read and discussed at its meetings, and the social gatherings with which they were accompanied, will take rank among the many pleasant memories of the Association.

The meeting opened, as you will remember, with an address by our esteemed friend, the President of the Representative Board, which he kindly undertook to deliver in the absence, through the severe, and I regret to add, protracted illness of the then President of the Association, Mr. White, and which was characterized by his usual directness and conciseness of detail on the legislative changes in the Medical Act as affecting our department. This was followed by a lucid exposition of the most approved method of enlisting photography, with its unique advantages of rapidity of execution combined with unerring fidelity of delineation, in the service of biological research by that well-known expert in histology, Mr. Charters White. Mr. Morton Smale then invited our attention to the important subject of dental education in a well-considered and thoughtful paper, which gave rise to an animated and discriminative, but not unfriendly, discussion. Dr. Cunningham followed with an elaborate and valuable paper dealing with a subject which has hardly yet received the attention to which it is entitled, "Dentistry in its Relation to the State," in which he urged that it was not only the duty but the interest of the War Office and the Admiralty to afford greater facilities, or to make better provision, for the care and preservation of the teeth of our soldiers and sailors. His contention was, if I am not mistaken, that as a matter of public economy, as increasing their health and efficiency, no less than common humanity, it is desirable that a better acquaintance with the principles and practice of dental surgery should be possessed by the medical officers in both services, and that one or more surgeon dentists should be appointed at depôts and garrison towns. This, with a valuable paper on a kindred subject, "Compulsory Attention to the Teeth of School Children, especially of the Army and Navy," by Mr. William McPherson Fisher, appeared to excite, as it deserved, great interest, and gave rise to an exhaustive and animated discussion.

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And although in the din and turmoil of party strife, and the exigencies of civil and domestic legislation, no immediate action seems likely to be taken in this direction, the agitation of the subject cannot fail to be of the most signal service, and it may be permitted to hope that the day is not far distant when the authors of these valuable papers may witness the realization of their well-considered proposals. At all events they are entitled to the thanks of the members of this Association for the zeal and ability which they have shown in drawing public attention to this important subject. A paper "On the Treatment of Alveolar Abscess," by Mr. Grayston, and another "On Public Appointments in Relation to Dental Surgery," by Mr. Gordon Jones, brought the work of the meeting of 1886-7 to a close.

Such a record is, I think it will be admitted, in itself an ample justification for the existence of the Association, for without the fixed time for the annual meeting, such a gathering of representative men from the old and new world, as was seen at our last meeting, such an interchange of courtesies and renewal of friendships among members of the profession, who might never otherwise be brought into contact, so many edifying discussions and valuable papers on matters of the deepest professional interest, would never have taken place. For, besides providing an audience and an arena, the meeting of the Association furnishes a fixed time for the production of the work, which might otherwise be relegated to that more convenient season which is so disastrous to prompt and worthy achievement. Then, again, the close and exact thinking, and the niceties of expression which go to the production of a good paper, are an excellent discipline of the mind which cannot but leave a man better and stronger than it found him; nor is it too much to say that an amount of literary ability and intellectual vigour may be developed under such a stimulus, of which the existence was hardly suspected under former less favouring conditions. So true is it that "Man grows greater with his greater aims."

I confess that I could wish that these golden advantages, and the possession of a Journal excellently conducted—a journal belonging to the Association, always available for the intercommunication of ideas among the members, and thus happily placed above the temptation of seeking popularity by lending itself to personalities or sensational paragraphs—should be regarded as sufficient to endear the Association to the members

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without expecting it to do the impossible work of stamping out irregular and dishonouring practice. The tares will always be found growing up among the wheat, whatever the soil, and however skilful may be the husbandry. But the good husbandman will direct his energies to the improvement of the latter rather than endanger the good crop by constantly dragging out the tares. I know that it is very discouraging to a man, who conducts his practice in accordance with a high ideal, to stand by and see, if only the apparent or temporary, success of the unscrupulous and mendacious charlatan. But let him take heart of grace when he remembers that in the long run the judgment of the public comes right, and that, in the meantime, he enjoys the approval of his own conscience and the respect of all good men. If all the available resources of the Association could be employed in the prosecution of men of this stamp in London alone, the amount of real good would be infinitesimally small; some of the delinquents would escape through the uncertain meshes of the best drawn Act and, as happened in a recent case, others might, through some legal technicality, triumphantly demand to be re-instated on the Register from which they had been most properly removed. The two great engines for raising our profession in the estimation of the public, and of the medical profession, are an educated public opinion and organised instruction in dental science, and these are working steadily and surely for this end. If we look back only some twenty years, we cannot fail to be struck with the real and substantial advance which has been made, not only in the development and resources of the art, but in the social and educational status of those now entering its ranks. And it is in this direction will be found the true and efficient means of at once freeing it from opprobrium and purging it from the contamination of the unworthy. Prosecutions and punitive and prohibitory proceedings, while they are fraught with irritation to all concerned, and are apt to be regarded by outsiders as a species of persecution, are of little real use or advantage to those on whose behalf they are instituted. Indeed, a prosecution which fails of its object is nothing short of a calamity, not only as being a waste of the funds of the Association, but as defining the limits of the legal enactments, and showing their impotence, and as indicating the direction in which the most stringent clauses may be successfully evaded. As has been said of wars, a victory is only a little less disastrous than a defeat from the enormous sacrifice of life and treasure

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which are the price at which alone it is gained; so the cost of even a successful prosecution is out of all proportion to the result. But as time goes on, less and less necessity will arise for such abortive proceedings as the public, with increasing understanding of the subject, will learn to appreciate the educated and honourable practitioner. Let us be patient, and remember how, twenty or thirty years ago, from the insufficient supply of qualified and educated practitioners, the unqualified greatly preponderated, and yet at that discouraging time there were in almost all the great towns, Bath, Cheltenham, Portsmouth, Southampton, Glasgow, Edinburgh, Manchester, Liverpool, Birmingham, &c., members of the profession who occupied distinguished positions, and who stood high in public and professional estimation. Since that time there has grown up a higher estimate of the services of the dental surgeon, and a greater demand for those services, and this having been met by recent legislative enactments and by better educational arrangements, there is no longer any excuse for resort to persons of little education, and still less professional knowledge. And less of that discouragement will in future be felt by the legitimate practitioner, which arises from want of discrimination on the part of the public, and the cry for prosecutions and means for stamping out piratical and discreditable practices, always a fruitless and thankless proceeding, will be less frequently heard.

And now, gentlemen, the moment has arrived when it behoves me to resign the presidency of this Association into the hands of my successor, lest it should be said of me "superfluous lags the veteran on the stage." You are now very naturally impatient to "welcome the coming, speed the parting guest," so with an expression of sincere thanks for the honourable position which, by your courtesy, I have enjoyed during the past year, I resign the chair to one who will, I am sure, fill it with dignity to himself and with conspicuous advantage to the Association.

The minutes having been read and confirmed,

Dr. JOHN SMITH (Edinburgh) said: When I entered this room I was not aware of the congenial and important duty which awaited me, for I have been asked to propose a vote of thanks to our retiring President, Sir Edwin Saunders, and I know that you will allow that the manner in which he has discharged the duties of the chair, and the admirable and eloquent address with which he has concluded them, has been all that the Association could possibly desire. You are aware also, gentlemen, that since he identified

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himself with the profession he has been a most liberal benefactor of every scheme which he considered likely to advance the interests of the Association. You are all acquainted with his munificence, his liberality, his urbanity, which he extends to all the members of the profession. He has adorned the profession; he has been an ornament to the profession, inasmuch as he has been the recipient of high honours at the hands of that sovereign whom he so loyally and pathetically alluded to in his address to-day. I have very great pleasure in proposing a cordial vote of thanks to Sir Edwin for his services during the time he has been President, and for the admirable address which he has given us, and his kindness in coming such a long distance as he has done on this occasion.

Mr. CHARLES S. TOMES: I have much pleasure in seconding that motion. Dr. Smith has said all that need be said, by saying that it needed nothing to be said, to commend Sir Edwin Saunders to the very hearty thanks of this meeting. In regard to the conduct of the Journal, as Chairman of the Journal Committee, I may say our lines sometimes lie in stony places, and we can hardly give satisfaction to everybody all round, and it is very satisfactory to us to hear that we have given satisfaction to somebody. I have much pleasure in seconding the motion.

Mr. SMITH TURNER then put the motion to the meeting, and it was cordially agreed to.

The PRESIDENT: I can hardly find words to thank you. This is a very affecting occasion, because I feel that I may not have many opportunities of meeting the members of this Association. In the course of nature I can hardly hope for it, but I am very glad to hear the flattering terms in which Dr. Smith and Mr. Charles Tomes have been pleased to place the motion before you, and the warm and cordial way in which you have accepted it. I have endeavoured to fulfil my duty, but I feel sure that I have drawn very largely on your forbearance, having on many occasions not been able to attend meetings which I ought to have attended, but which meetings I am quite sure were well conducted without my assistance, and that my assistance was sometimes advantageous from not being tendered.

Sir Edwin Saunders then left the chair, his place being filled by Mr. J. R. BROWNLIE, as President of the Association, who proceeded to deliver his opening address as follows:—

My first duty in assuming the office of President is to thank you most heartily for electing me to this honourable position.

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Doubtless I have indulged—as I suppose every member of the Association does—in looking forward to a time when, aided by the degree of deference to which years may lay claim, and by the measure of experience which they should always bring, and with a claim resting upon years of service, I might be called on to preside over the British Dental Association. Patience might have brought about the fulfilment of such hopes, and time would have better fitted for the responsibilities of office. As it is, such expectations have been anticipated, and I esteem the honour none the less that it comes as an expression of your favour, and as a compliment to Glasgow and the west of Scotland.

I do not feel it to be a light matter to be called on to preside over such an Association, and I do feel that I have succeeded to the office under circumstances of more than usual responsibility, under conditions calculated to throw into relief all shortcomings, and to intensify venial faults by force of contrast. It is my lot to follow immediately in succession one of the most eminent members of the profession; one singularly well qualified by natural gifts and great experience to fill the office of President. No movement fitted to promote the best interests of the profession has lacked his support, while the due provision for the training of students has been to him, and is now, a subject of special care. The London school especially—my *alma mater*—has found in him one of its staunchest friends and most liberal supporters. Nor can we be willing to forget in this connection, that with our ex-president the dental profession entered upon a new epoch in its history. For the first time the dignity of knighthood has been conferred upon one of its members, and on professional grounds alone—an honour which must be the more esteemed by him that it carries with it the hearty congratulations of the whole profession.

While I cannot but wish that the office of President had been entrusted to abler hands, I have also indulged in the thought that, apart from all other considerations, I might look upon this call to preside over the British Dental Association as possibly containing more than is immediately apparent. I would fain hope that this is so, for I could then plead a representative character as my title and justification in accepting office to-day.

Two generations of men are represented in the membership of the Association—those who have laboured and those who are reaping the fruits of their labours. The measures by which the

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profession has attained to its present position are due, no doubt, to a prevalent feeling of dissatisfaction with the previous state of matters.

But however urgent the need, these measures were not formulated and secured without careful consideration and much effort. Till now the Association has profited by the active supervision of its founders, of the men who have wrought hard to break down the spirit of isolation which has proved so great an obstacle, and to establish a bond of union in making the dental licence imperative and also a legal qualification. The task was no light one, and the most complete success in its accomplishment could do no more for its promotors than gain for them the gratitude of those who were to reap the benefit of their exertions. Surely it was incumbent on the first of the later generation, who has been honoured with the call, one who was himself an early student of that pioneer in the work of dental reform, the London Dental School—and especially in view of the retirement of a leader whose genius has contributed so much to our knowledge, and who has laboured so long and so well on behalf of his profession—surely it was incumbent upon one who early profited by such labours, apart from all other considerations, to testify for himself, and for others so placed, that we are neither thankless nor indifferent; that we are prepared, as occasion may require, and to the extent of our ability, to accord to our seniors the satisfaction of seeing the work they have so happily inaugurated continued by younger, though necessarily less experienced, hands.

Be that as it may, it is now my pleasing duty to welcome the British Dental Association to Glasgow—to a city having associated with it memories which we must all be disposed to cherish, and memories, too, which, save for the lessons they teach, we can now afford to forget. Let me remind you, gentlemen, that you are now on what should be to us classic ground, in a neighbourhood possessing a special interest from having been the scene of the first essay in the life of the man who has been fitly described as the father of the dental profession. In the near neighbourhood John Hunter was born, and in Glasgow he worked as a tradesman during his earlier years, before devoting himself to more congenial work, and in which he so distinguished himself — work which has made his name treasured by posterity, and his writings to be quoted to this day, especially those in which we are more particularly interested. Probably some of you are reminded

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of other associations connected with Glasgow of a much less pleasing character. That through a period of effort, other prominent citizens, whose names there is no need to hand down in this connection to posterity, did not favourably regard the measures by which it was sought to give effect to our professional aspirations. Some of you may call to mind the additional burden imposed by active hostility on the part of certain of our officials. To one our effort was an attempt at a gigantic trades union. To another it was the thin end of the wedge which was to rend the medical profession into as many sections as there are organs in the body. I trust the diligence displayed by every member of the profession in Glasgow in combating such opposition, was some consolation to those principally engaged in piloting the measure through parliament. If trades-unionism had been our aim, trades-unions are not unlawful, nor need they be hurtful to anybody. To talk of rending the medical profession was rather a curious mode of describing sub-division of labour, since by such sub-division, by concentrating attention to one department, with of course a knowledge of the subject as a whole, the practice of the healing art has been advanced to greater achievements than was otherwise possible.

But the contest is over. For several years past the Dentists Act has been law. Our position has been defined for us, and if we have occasion to complain, it is that we have got so very much more than we asked for. It was known that there were some two thousand practising dentistry immediately preceding the introduction of the Dentists Act, and parliament in its wisdom made provision for something like three times that number. We got much of what we wanted; we got also that which was neither wanted by us, nor capable of being of use to those who required it. Right had to give way to might, and our good intentions were marred in the execution. But however much the Dentists Act may differ from the Act drafted for the dentists, the progressive spirit of the original measure remains. The common portal to be reached by a compulsory course of study followed by examination remains, and the good we sought to do in our own day becomes the inheritance of those who come after. So much has been secured. An honest register and a specially educated body of practitioners have been bound up with the future, and with the one we will assuredly have the other.

But the benefits of legislation are not all prospective, and short

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as the period of probation has been, the evidence of its influence is accumulating. It is pleasant in this connection to note the interest taken in us, its youngest relative, by the medical profession, as we see it in the action of its representative institutions —ancient seats of learning interesting themselves in us, medical schools competing for the privilege of educating our youth, and licensing boards formed in connection therewith. The special section of the dental students' curriculum is taken in hand by dental schools and hospitals, in all the larger centres of population all over the country. Thus the licence in dental surgery grows in numbers, and in public appreciation. I know not if it is the company parliament decreed we should keep, which has stimulated so many to take advantage of the *sine curriculo* provisions, but I do know that in this neighbourhood the possessors of the licence in dental surgery have increased from one per cent. within ten years anterior to the passing of the Act, to fifty per cent. within ten years thereafter.

Amongst the more important results of legislation, we must give a very prominent place to the British Dental Association. Formed to give effect to the spirit and the provision of the Dentists Act, it is yearly drawing closer professional ties. It is bringing together those who might not otherwise have met, and under conditions which cannot fail to promote the art and the interests of the dentist. These annual gatherings afford an opportunity for friendly intercourse and for the interchange of ideas. As co-workers in the cause of humanity, improved processes and new inventions are ceasing to be made to do secret service on behalf of their promoters; if they are deemed capable of standing the test of professional eyes and criticism, they are used rather to promote the reputation of their possessor amongst his fellows, or at the least to add further contributions to the long list of dental curiosities of invention. The programme of to-day, as of former years, bears witness to the Association's disposition to be of service to the community at large; while its Benevolent Fund suggests the possession of some measure of that virtue which is said to begin at home. By this fund the unfortunate, the widow and the orphan are cared for, the young are educated, and the helpless are put in the way of maintaining themselves. By this voluntary organisation, contributors may share in a good work with the knowledge that their contributions will be wholly devoted to the purpose for which they were given. The central idea of the British Dental

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Association is political, but its sympathies are as wide as the profession itself, and it is much to be desired that its connections with the profession will soon be equally widespread, and that the opportunity afforded by the formation of additional branches will be taken advantage of to the fullest extent.

If I were to make it appear that we have as yet great occasion to rest and be thankful, I should misrepresent the situation. A first attempt at legislation must necessarily leave room for improvement. Already, certain alterations have been effected with advantage, and it may be expected that from time to time opportunities will present themselves for further adjustment of the provisions of the Act. Such opportunities are not to be neglected, but is there no danger of relying to too great an extent upon such help—of laying too much stress upon legislative interference? Now, more than ever, men are invited to look to Parliamentary interference as the means of removing grievances, and ameliorating the conditions under which we live, and dentists have not been exempt from conceiving great expectations from an Act of Parliament. An Act has been obtained, yet it does not appear to have given entire satisfaction. There are those who are not wholly pleased with it, and who allow themselves occasionally to say hard things concerning it. We are not so much interested in such fault-finding as in ascertaining that there is no real occasion for it. Such an enactment must provide for certain pains and penalties, and it is not difficult to account for the prominence which such provisions have attained to in the minds of many, but it is to slander this measure to represent it as mainly an Act for the repression of dishonest procedure, not otherwise enumerated in the statute book. Penal clauses were necessary, and the expectation founded on them of at once sweeping from within our borders every cause of offence was doubtless an attractive feature to many minds. The very moderate use which it has been thought fit to make of the powers conferred by these clauses has consequently proved a source of disappointment. But where is the occasion for indulging such feelings? Laws for the repression and the punishment of crime have existed from time immemorial. They have been enforced with all the resources and authority of goverment, but crime is not yet extinguished. When petty larceny was made a capital crime, the extreme penalty of the law failed in years gone by to put an end to it. Need we then hesitate to own that the Dentists Act, with the

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support of a purely voluntary Association, has not sufficed in less than ten years to extinguish the evils of which we justly complain? Is it reasonable to speak of failure because we have found, as others have found repeatedly in similar connection, that, allied to a disposition to evade the law, a degree of invention, a measure of ability may exist which, properly directed, would have sufficed to raise the offenders from the level of social parasites to that of reputable members of the profession, and useful members of society. Such provisions as the penal clauses of the Dentists Act can be said to fail only in the sense in which all such legislation must fail. There are evils which are presently capable of cure, and there are those which, for the present, it may be expedient to put up with—proceedings of which we cannot approve, but concerning which we may adopt the advice lately tendered by an eminent statesman to his adherents, and wink hard, as even older and stronger associations have at times seen fit to do.

The degree of moderation with which the penal clauses have been enforced is to the credit of this Association, and the convictions following on complaint have justified its interference and set it free from any suspicion of oppression. The more flagrant offenders have learnt that such provisions can be used, and that there is no intention of letting them become a dead letter. Typical cases have only so far been selected. Valuable precedents have been established, and good must result from the convictions in court, and the exposure of the various systems followed by pretenders. We have, no doubt, assumed a responsibility in this matter, but as imposture can only exist where there is lack of information, not to say indifference, on the part of a considerable section of the community, this Association must be credited with a due discharge of its duty, as much in setting up such landmarks as will suffice for public information and guidance, as in the punishment of those who are breaking the laws which Parliament has thought good to pass for the public well-being. On this point we make no uncertain sound, for no man who is entitled to call himself "dentist" will hesitate to do so. The term is a legal title, the property of registered practitioners only. Any departure from it is wholly unnecessary, and while it might be supposed that another term would indicate only a degree of originality, it is much more probable that such other term has been assumed because the employer of it has neither the right to seek for public confidence, nor any part in a profession of which he dare not even assume the name.

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We may not lose sight yet, in reviewing the results of legislation, of the nature and extent of the task imposed upon those who undertook to promote it—a perfect chaos to be reduced to order; a *status* to be formed; education to be provided for, and a reasonable security obtained that the sacrifices thus entailed should not be thrown away. Various plans were proposed, and most of us can recall some of the proposals by which it was sought to assign a definite position to our specialty. The difficulty lay in giving due effect to the necessity for both a surgical and a mechanical training. No existing qualification could be said to meet the want, and to add a surgeon's training in its entirety to any reasonable period of apprenticeship could not be thought of. But between these two a compromise was effected. By lopping off that which was not essential on both sides a curriculum remained adapted to the wants of the dental student, and analogous in point of time and previous preparation to that to be observed by the student of general surgery. To certify to the due observance of prescribed conditions and to a certain degree of attainment therein, as proved by examination, the licence in dental surgery was called into existence, and has become the minimum of preparation to which the law permits the title "dentist." To the great body of the men now devoting themselves to dentistry, the L.D.S. must form their sole claim for admission to the Dentists' Register, and to them especially we must look to sustain its reputation. It rests with them to prove that it is a fair and reasonable interpretation of the necessities of the case—that apart from any other qualification, it is not merely sufficient for a useful and successful career, but that it may by itself be associated with the very highest attainments in the practice of our art.

To those who require more the way is open, and they have every encouragement to avail themselves to the full extent of their opportunity. He will best fulfil his mission who brings to the discharge of his duty the most extensive and varied information and hands drilled to give the utmost effect to his intentions in the discharge of all such services as he may be called on to render. To such a one the acquisition of any available title is a work of time and effort. Of medical titles at home and dental titles abroad there is no lack, and so long as they are legitimately acquired and used the additional information and experience they represent must prove a gain to their possessor and a credit to the profession of which he is a member. But the medallion has its

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obverse—the most coveted distinctions have been imitated. We have not now to complain so much of absolutely base metal as of the extent to which it is alloyed. Surely two out of so many dental diplomas granted in America is too small a proportion to be found deserving a place on our Dentists' Register. Probably we ought now to congratulate ourselves that the issue of really counterfeit diplomas is at an end and that in this respect some improvement has been effected. It is over a dozen years since we had here in Glasgow an agency for the sale of bogus diplomas, and at that time I was favoured with a visit by the accredited agent of one of these so-called American colleges, having full authority to examine *in absentia*, and to grant any or as many titles as might be wanted. This man's agency extended to granting the degree of doctor in divinity, medicine, dentistry and some other professions, and the charge was moderate considering the outlay usually entailed in the acquisition of such honours. So flagrant an abuse could not long survive. This "College" was suppressed, and it does not appear that such honours are now to be had on the like easy terms. We have something still, however, to hope for at the hands of our transatlantic brethren. We are still left to contend with the varying value of American dental diplomas, nor can we be content that the title conferred should acquire by crossing the ocean a fictitious value, that it should have one meaning in America and a different meaning here. The situation is no doubt a difficult one. We may be unable to realise adequately the difficulty of finding a remedy, but while we suffer under it, we are interested, and must welcome every indication that the subject will yet receive the attention it merits. Surely the country which has done so much to enhance the usefulness and extend the resources of our profession, is capable of producing a Tomes—aye, and a Smith-Turner too; the ability to plan and the energy to carry through such measures as will gain for American dental qualifications a more satisfactory *status*, and fit them one and all to take their place on a footing with our own licence in dental surgery.

In our neighbours' affairs we may claim to be permitted a neighbourly interest. We gladly recognise all that we find to be good, and where we have occasion to feel aggrieved we may be allowed to hint at the possibility of improvement. Our *raison d'être*, however, lies nearer home, and the British Dental Association is still in its youth. It has assumed a most comprehensive name, and it has yet to make good its claim to it. Its name

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includes, as the legitimate field of the Association's operations, the whole of an empire on which the sun never sets. Are we to understand the term "British" as employed in its limited, or in its widest sense? To the Great Britain with which we are familiar, or the Greater Britain which lies beyond? From time to time we are reminded of this larger field, by the appearance of names on the rolls of our dental schools which were never invented in these isles. In process of time their owners pass from us, in company, it may be, with others who elect to try their fortunes in some one or other of our colonial possessions. Are we to let these men go as if we had no further interests in common? An inhospitable climate sends a Coleman abroad in search of the health denied to him here, and the warm interest he displayed in the affairs of the Association terminates and is lost to it. We have not yet formed colonial connections.

Our sphere of action has been limited, and we may still increase within this limited sphere. But not until we have taken possession of this wider area, till this Association is represented by branches wherever dentists are in numbers sufficient to combine for the purpose, can we claim to be in the fullest acceptation of the term, the "British" Dental Association.

Mr. Browne Mason (Exeter): I rise to propose a very hearty vote of thanks for the very able address that we have just heard from our new President—one that we must all have listened to with very great pleasure. He has gone over a very wide range, and his address has been full of matters for deep thought. I propose a hearty vote of thanks to him for his Presidential address to-day.

The motion was seconded by Mr. Wilson, and put to the meeting by Sir Edwin Saunders, and heartily agreed to.

After the presidential address had been delivered, the meeting proceeded to listen to and discuss the various papers.

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On Water Supply and Pressure, with reference to the Hastie Motor.

By WALTER CAMPBELL, L.D.S.Eng.

Mr. President and Gentlemen.—Our Hon. Secretary readily gave me permission to make this communication with reference to the water pressure and supply of the towns in the United Kingdom. I was led to make this request on reading the annotations of our Editor in the last number of our Journal. With reference to the Hastie Motor, he says "However ingeniously a hydraulic engine may be constructed, the continuous and plentiful supply of water will ever be the primary condition of success. In this particular the city of Glasgow is especially favoured, its water supply from Loch Katerine being not only continuous, but of sufficient pressure to afford a very strong power, even at the top of the highest tenements." Believing that the Editor was giving expression to the prevailing, but erroneous opinion, with regard to water pressure and supply in the various towns, it occurred to me that I would be doing a service to those members who might be contemplating the introduction of water power into their surgeries, by collecting and bringing before them statistics, showing the supply and pressure in the leading towns of the United Kingdom. Before reading these, however, you will permit me to give you the results of my experience since November last, as to what I consider the simplest and best way of fitting up and working the motor in combination with the dental engine.

In a short paper I read before the Odonto-Chirurgical Society in March last, and which appeared in our Journal for April, I compared the Hastie Engine with other motors known to me, with the result that, to my thinking, the Hastie was incomparably more efficient and less costly in working than any others, and the experience I have since gained has confirmed all that I then said. I have had considerable correspondence with members since my communication appeared in our Journal. Several of these gentlemen have been waiting patiently for diagrams which I promised to send as soon as the Messrs. Hastie were prepared to supply motors to the profession. The latter gentlemen, however, have made no haste in this matter. I believe they purposely delayed making them in numbers until they were thoroughly convinced, after some working experience, that their motor was

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suitable for dental purposes. One or two, however, were early supplied with the motors, as an additional means of testing their usefulness in this direction.

Mr. McLeod, of Edinburgh, kept the motor I showed at the Edinburgh meeting in March. He fitted it up in exactly the same manner as my own and has been working with it constantly since then. Mr. Brownlie, our esteemed President, also came to Dundee to see the motor at work. He examined and tested its working power, and felt satisfied that this motor was the most perfect for our work known to him. He was not, however, quite satisfied with my method of starting and stopping the motor. Having procured one for himself, he set to work to devise a method of working both motor and dental engine more to his own mind. I need say little as to the comparative merits of either, as you will have an opportunity of examining both at work and judging for yourselves. Mr. Brownlie has generously offered to show his method of working the motor and dental appliance. I am sure our President will not feel offended when I say that, to my thinking, his method does not give a correct idea of the perfect control the dental operator can have over its speed, and in this, to me at least, lies its great merit. Mr. Brownlie's method, I may state in a sentence, is to start the motor with one button, and to have three different rates of speed, pushed from slow to fast with this starting button, but to bring the motor from fast to slow, he must use another button to stop the motor and start again to slow; whereas, my plan of working is to have one or two, or three (if anyone wished to have this wide range), but for each button to have perfect control of the motor, independent of the others. Believing, as I do, that my way of working the motor is superior to Mr. Brownlie's, I have got a motor fitted up with upright rod and all-round joint, connecting White's ratchet and flexible arm, as I have them at work in my surgery. This arrangement Messrs. Ash will be pleased to show at their table, at the Dental Hospital, in George Square. I may explain that I have got this motor and dental appliance into the narrowest working compass, for the purpose of showing the members present the easy working and perfect control one can have over its speed, and for the International Medical Congress at Washington, where I also intend to show it.

I need scarcely state that the button or buttons for starting, and regulating the speed can be placed in any position round the

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operating chair, that may be desired, and I may add that there is scarcely any limit to the locality for fixing the motor. When it can be made available, however, I consider the room below the surgery to be the simplest. In working, the oscillating cylinders are not altogether free from noise. This, however, is reduced to a minimum, when a rubber washer, about a quarter of an inch in thickness, is placed above and below each screw, used for fixing purposes.

Another method of working, and I think a very good one, when the room below cannot be used, is to have the motor fixed between the joists close to the wall, with a cord running from the motor up to a wall bracket. I have got a telescopic bracket made for my friend, Mr. Matthew, of Edinburgh, to be worked by a motor fixed between the joists and the floor, the motor to be fixed in an iron box and let into the floor, with a lid to open and shut for oiling purposes. If practicable, this bracket arrangement will be shown at work at the Dental Hospital by the Messrs. Ash.

I believe that a motor of one kind or another will be used sooner or later by all dental surgeons, and by many as soon as they can see a really efficient one. The maximum cost of working the Hastie Motor will be, as far as I can judge, one guinea per annum. This should be the maximum, and is what I and others pay in Dundee. In Glasgow, where the price of water is just one-half of what it is in Dundee, we might expect the cost would be a half, and I understand from Mr. Brownlie that the charge for his motor is 10s. 6d. per annum.

I am led to believe, on the authority of Mr. Watson, engineer of the Dundee Water Works, that the Hastie is the only motor which regulates the consumption of water in accordance with the work required to be done. This, I have no doubt, is well-known to all engineers of water works, and they will readily allow the motor to be run at this nominal price of from 10s. 6d. to £1 1s. per annum.

This motor, I have no doubt, will also in time be largely used in dental workrooms. It is already in use, and rendering splendid service in one workroom, viz., Mr. Walker's of Dundee, running two lathes with ease.

Other engines might be used in the workroom, such as gas or hot air. I have seen a gas engine used in this way, but from some cause the atmosphere was not of the sweetest, the presence of coal gas being very perceptible.

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Now, gentlemen, with reference to water pressure and supply in the various towns, I regret to say that some of the engineers have not yet replied to my queries. The members, however, will see that Glasgow is by no means so specially favoured as some, I know, have thought. Some engineers have returned their pressure by pounds, others by feet, I give them as they have been returned. It is almost needless to remark that every two feet gives one pound of pressure.

Town.	SUPPLY. Constant or Intermittent.	PRESSURE. Maximum and Minimum.
Aberdeen	Constant	270-50ft.
Arbroath	Constant	100-10ft.
Ayr	Constant	100-50ft.
Barnsley	Constant	160-20lbs.
Bath	Intermittent	290-50ft.
Belfast	Intermittent	70-10lbs.
Birkenhead	Chiefly Constant	100-50ft.
Birmingham	Constant	120-40lbs.
Blackburn	Constant	100-10lbs.
Bolton	Constant	130-12lbs.
Bradford	Constant	600ft.
Brighton	Constant and Intermittent	140-60ft.
Brompton	Constant	90lbs.
Bury	Constant	85-30lbs.
Cambridge	Constant	80-50lbs.
Cardiff	Constant	80ft.
Carlisle	Constant	80-30ft.
Cheltenham	Intermittent	230-100ft.
Chester	Constant and Intermittent	120-35ft.
Coventry	Constant	60-40lbs.
Croydon	Constant	300-30ft.
Derby	Constant	225-70ft.
Dublin	Constant	250-100ft.
Dumfries	Constant	65-40lbs.
Durham	Constant	230ft.
Edinburgh	Nearly Constant	190-47ft.
Exeter	Constant	110-27lbs.
Glasgow	Constant	95-70lbs.
Greenock	Constant	300-80ft.
Halifax	Constant	120-85lbs.
Huddersfield	Intermittent	300-50ft.
Hull	Constant	150-50ft.
Inverness	Constant	95ft.
Kilmarnock	Constant	120-60ft.
Leamington	Constant	58-27lbs.
Leeds	Constant	180-10lbs.
Leicester	Constant	200-50ft.
Liverpool	Intermittent	80-25lbs.
East London Water Works Co., Old Ford	Constant	40ft.
Chelsea Water Works Co., Pimlico, S.W.	Partly Constant	140-60ft.
Southwark and Vauxhall Water Co.	Mostly Constant	300-30ft.
Kent Water Works, Deptford, S.E.	About half is Constant	500ft.

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Town.	SUPPLY. Constant or Intermittent.	PRESSURE. Maximum and Minimum.
Grand Junction Water Works Co., Notting Hill, W.	Two-thirds Constant ...	120-80ft.
Lambeth Water Works, Brixton Hill, S.W.	Half is Constant	80-60ft.
New River Office, E.C.	Constant and Intermittent	7cft.
West Middlesex Water Works, Hammersmith, W.	One-third Constant ...	170-100ft.
Manchester	Constant	400-125ft.
Merthyr Tydvil	Constant	220-20ft.
Newcastle	Constant	385-50ft.
Norwich	Constant	150ft.
Nottingham...	Constant	300-30ft.
Preston	Constant	34-22lbs.
Plymouth	Constant	60-20lbs.
Portsmouth	Constant	160ft.
Scarborough	Constant	150-35ft.
Southampton	Constant	70-15lbs.
Southport	Constant	240ft.
Stafford	Partly Constant	300-10ft.
Swansea	Constant and Intermittent	300-10ft.
Wolverhampton	Constant	110lbs.
York...	Constant	30-15lbs.

The PRESIDENT, in response to a request that he would give the meeting the result of his experience, said he saw no occasion to make any modification in his already published remarks on the water motor. He expressed regret that the water arrangements at the Dental Hospital did not afford the pressure they had expected, in consequence of which the engine worked with a little uncertainty. In answer to an inquiry as to which side of the chair the motor was placed, the President said: "On no side. It is a wall bracket, and swings out from the wall and travels with the hand in altering your position. It admits of a very extended range of motion, and moves so freely that there is no weight whatever in altering the position. The floor is kept perfectly clear, and there is nothing but the stopping and starting arrangement on the floor, which does not interfere with one's freedom in any way."

Dr. STACK said that the value of such an apparatus as this in our dental surgeries depended greatly on the practical success of it. He had tried various motors and had, he regretted to say, abandoned them, but would hail with the greatest satisfaction a motor to which he could give a long lease in his dental surgery. It was impossible to discuss the merits of the particular motor before them without having an opportunity of practical observa-

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tion of the machine, and he would suggest that, if it was at all possible, before the discussion of Mr. Campbell's paper came on, the members should in some way or other be afforded an opportunity of seeing the practical merits of this machine.

The PRESIDENT: There are two at 10, Brandon Place, and at the Dental Hospital, where the motors may be seen at work. I quite appreciate the suggestion, because it is a thing that you should see in action before you can appreciate what it is. If no other gentleman wishes to say anything further on this point, we may hold the discussion as adjourned.

Mr. SMITH TURNER: With your permission, I think some one might tell us about the amount of pressure that is required. After all, we may be all agreed as to the admirable arrangement of the engine, and the facility with which the hand piece can be guided in any direction by a swing bracket or anything of the kind; but the great thing is the source of power. How, for instance, would we be situated in London, where the water is turned off periodically, and we have nothing but perhaps a single cistern to supply us with water? We may have a cistern at the top of the house, but the cistern would very soon be exhausted, and what are we to do then? Mr. Campbell seems to think that Glasgow is not so favourably circumstanced as some people imagine. I think it is peculiarly favourably circumstanced in respect of the supply of water. You have, I believe, a continuous supply here. Now, we have an intermittent or remittent supply in London, and it seems to me that the water motor in that city is a thing of the future until the Water Companies can be converted to the continuous supply system.

Mr. BROWNE-MASON: I think you will find most towns in the same case. In Exeter we are supposed to have a continuous supply, but during the last six weeks we have had a very intermittent supply, with many apologies from the Town Council, stating that they would give us a continuous supply, but that we are exhausting the River Exe.

Mr. PEARSALL (Dublin): Some years ago I purchased a water motor, made by White & Co. It was a simple thing with two vulcanite wheels. But, in Dublin, when anybody opened a tap in the house, the machine practically stopped and the amount of centrifugal force was valueless for an engine, but immediately the tap was stopped I was able to work it satisfactorily. I gave it up completely, because it was apt to get frozen, and you might be in

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a most important part of the cavity and be left with it standing. I see here that the Dublin pressure is put down at 250 pounds at 100 feet, and I am inclined to think that that is exaggerated. I learn from enquiry that pressure is 75 to 80 feet. If it would work with a 70 feet pressure, or even down to 30 feet, we could use it with the greatest ease and be very glad of it; it would be very advantageous to have enormous power at the touching of a button.

Mr. BIGGS (Glasgow): I would suggest that members reserve their criticism till they have seen it at work, and I am sure that few gentlemen would believe the small quantity of water that is necessary. To-morrow it will be in full operation at the Dental Hospital.

Mr. WALKER (Dundee): I have had a motor working for six weeks and I find it very handy. I think there will be a few towns where it will not be of service. We have a good supply in Dundee, and other towns, I venture to say, will have quite enough of pressure at least for the operating room. My surgery is on the second floor, and there I find enough pressure, but I cannot give the statistics in Dundee at that height.

After a few words from Dr. STACK the further discussion of the subject was postponed until the gentlemen had had an opportunity of seeing the practical working of the apparatus.

The PRESIDENT: It was proposed by Mr. Cumming to give a demonstration on his new method of "Continuous Gum Work" with any form and make of tooth, but I have to explain that after consideration he thought it better to give a paper on the subject, as we were all familiar with the firing process, and there was no necessity for carrying out this portion of the procedure. Mr. Cumming has written a paper on the subject and I call upon him to read it.

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Continuous Gum Work, with any Form and Make of Tooth.

By JAMES CUMMING, L.D.S.Glas.

Mr. President and Gentlemen,—I desire to call your attention to what I think is an improvement in a process in the mechanical branch of our profession.

Most of you have seen, and some have tried the Verrier process of producing continuous gum facings. Probably all will admit that there is considerable difficulty and uncertainty in producing a satisfactory piece of work of this kind by the present process. First of all, a particular kind of tooth must be used. Second, when the work is finished there is considerable warpage, sometimes entirely spoiling your articulation. Third, the teeth get fused and made unsightly on the surface, from being exposed to the great heat required to fuse the gum-facing. Fourth, there is the tendency of the facing to crack, even when the piece is being worn in the mouth, and without any apparent cause.

The improvements I have been working out will certainly do away with the first three defects mentioned, and to a *great extent*, if not entirely, with the fourth and last defect mentioned. This process, with all these defects, was a step in advance, and worthily, Verrier's name was attached to it. But for this process, and the trial of it, and the failures to produce for myself satisfactory results with it, I would not have the honour to lay my improvements before you. You will, perhaps, then excuse me, if I venture to call them the Cumming Method of producing Mineral Gum Facings, with any form of tooth. I may mention here, that it is not a process that can be successfully accomplished by a lad of a year's experience in a workroom. At the same time, any difficulties there may be, can easily be overcome by a trained mechanical dentist.

I have nothing new to relate with regard to the firing or baking, unless this be new, that I never trust to the "*look*" of the piece with the eye, in a glaring furnace—I invariably use a test-rod. If firing the "body," I put a bit of it on the rod, and the moment I find this test-bit (looking at it outside the furnace and below red heat) just to the baked and unglazed condition, I instantly turn off gas, and slip the rubber air-tube from the burner, and allow the furnace to cool gradually below 200°F., before taking off the

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covering from the face of the muffle. When baking the gum enamel, I go through the same process with even more care, for it is here it will tell, and just as the test-piece gets glazed slightly, I cut off the heat supply as before. By attention to these details in furnacing, you will be rewarded by certain and uniformly favourable results. There is therefore no necessity for a furnace demonstration.

With the aid of a few models, and what I may call a skeleton or two of the work in different stages of progress, I hope to make the process plainly understood by all.

First of all then, you are supposed to have modelled up your work with wax--it may be a full set, or only a few teeth. Fit the same in the mouth to see that it represents nature there. It is then taken to the workroom, and placed on any form of articulator you are in the habit of using. Bites are taken, exactly as you see on this model (handed round.)

This is the first stage, and gives and secures the exact height and position you desire the teeth to have in the mouth when the work is finished.

The second stage is represented in the upper model. The teeth being held in position by the wax at their necks, and the plaster at the cutting and grinding surfaces. The wax contour is equally cut away, just as much as to allow a thin platina plate, and the gum-facing to be added, so as to represent the contour the set had when fitted in the mouth at first. The teeth are then carefully taken from their position at this, the third stage, so that each will leave its distinct mark or impression of the neck or base, on the wax. The model in this state, with the wax upon it, is so arranged that a casting can be taken of the front gum, and a platina plate struck, exactly like the accompanying silver plate, which you can put into position on the model and wax, and so fully understand this stage. The teeth are now replaced with a slight wax attachment, exactly into position. To accomplish this they each may require a little fine fitting at the lathe with a fine corundum wheel, so as to sit on the platina as they did on the wax.

To prevent them being raised the thickness of the platina, I sink each the thickness of my nail into the wax before I take the casting, but with all that, a point or two will require fitting as I have said. When that is done take off the teeth and plate, and roughen the plate on both sides slightly, as you see this. Then

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boil teeth and plate to free them from grease. Before replacing the plate rub the surface of the wax with French chalk, so that the plate will be easily separated from it for the firing or baking. Rub the necks and base of the teeth with French chalk also, as this, in my experience makes the lifting off process easier, which I shall explain immediately. Lightly refix the teeth in position, and then work in, with spatula and brush, your gum-body till you have brought it to the contour your wax had. You then lift the teeth carefully off, one by one, from the platina and gum-body sockets; and if the body be a proper dampness the teeth will leave it pretty clean, and without sinking or altering the imprints of the necks of the teeth. The plate, with the body on it, is now gently forced or raised from position with the end of your spatula, and caught with the hand as it slides off in such a manner as will not injure the form of the body. In this condition it is ready to be baked. No plaster nor asbestos is required. They invariably cause shrinkage or warpage. All that is required is a good platina stage, upon which it is at once to be laid. A platina rod or two is required, like this; I find one does well. It is laid across, from socket of second molar to socket of second molar on opposite side, and if a second be needed place it across from first bicuspid to first bicuspid. The rods must have a notch on each end, with the points that must lie on the platina socket a little longer than the lower points, so that it cannot fall through when all is in a state of expansion. The rods I make in the way you see, so that they may fit any width by shifting the screw. I left the piece on the stage. Put now the rod or rods on so that the notch in the rod will rest on the inner edge of the plate, and so secure it from shrinking when cooling. Put your stage with its contents in the muffle carefully and bake. When cool you will find it will go to position as perfectly as before baking. If the body is well put on you will find one baking only required. If it be cracked another baking of course is required. I may say here the time I take to bake the body is from eleven to twelve minutes. For gum enamel from fourteen to fifteen minutes. That is for Allen's materials. Your work then has been baked and replaced on model. The teeth may (?) require a little fitting in the manner described to get well into their sockets, in which they will resemble a natural tooth in the dry socket of a jaw, as the body will have slightly shrunk. The facing and teeth are again cleansed from grease and replaced, but rub the necks of the

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teeth as before with French chalk. The gum enamel is then carefully put on with spatula and brush until you have the contour you desire. Then take off the teeth with the same care as before. Place the facing on the stage, put on the supporting rods and bake. When it comes out, if the colour of gum is not as deep as you require paint on a little more and bake again. Put now the finished facing in its position, lay in the teeth, and they should fit as this (handed round). The teeth here have not been touched with a corundum wheel or anything, neither for the body nor gum enamel. You have now simply to model up the piece in the palate with wax, giving it the form you desire, and when this is done lift all off the model and put it on your duplicate. Flask and pack with care, and vulcanize, and finish. I may say there is not much fear of the facing coming out of the vulcanizer cracked, unless the packing and screwing down has been very carelessly done. If all be done with care the result will be as you see in those finished specimens, or even more like nature.

You will see that this process of facing can as easily be added to a gold base plate as to vulcanite. I have earnestly tried to make my process plain and easily grasped by all, and I hope I have succeeded. I shall now mention its advantages in detail.

In the present process the teeth being all fused to the gum facing and frequently one to the other also, the piece is too rigid, and in occlusions of the jaw make a harsh unnatural noise, whereas, with my method, the teeth rest entirely on a soft base as it were, and consequently emit a softer and more natural sound, and if we set the teeth slightly apart, which can easily be done in my process, then the improvement in this respect is much greater. Some may say that these spaces will fill with food and look unsightly. They will fill with food, but if they remain so for long after a meal, it is the fault of the wearer, as spaces between the natural teeth would fill also. Then again, a tooth will break by accident. In the old process (may I call it?) of fusing, it is a most formidable job to make an efficient repair, whereas, in my process, it is as easy as to replace a tooth on a vulcanite set. To prove this, in the large lower completed set before you, a tooth was cut entirely off and put back by re-vulcanizing. I do not know if anyone here will find out where the repair has been made. Then again—in the Verrier and other processes, a certain kind of tooth could only be used, whereas (as you will see from the

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different kinds of teeth on the large upper and lower set) any form and make of tooth can be used. If I had had time I would have shown that even natural teeth could be used, for those who have the taste for them.

Now, when all this can be done without the use of pure gold as a solder—plaster of Paris and asbestos as a strengthener when the facing is in the fire, and the teeth lying securely on your bench, waiting to leap, as it were, into their sockets, free and untouched by the fire that has consumed so many, surely you will agree that this should be the coming process of continuous gum-facing. There are one or two points of interest I almost forgot to mention. The smaller upper and lower set you see is made from the mouth of a lady about twenty-six years. The platina and gum-facing together weigh respectively 4 dwt., 22 grs.; 4 dwt. 12 grs. The facing of the larger upper and lower set weigh respectively 5 dwts. 8 grs.; 4 dwt. 1 gr. I desired to make this facing on this set somewhat paler than on the other, so as to represent the appearance of a person's gum of sixty years. Anxious to try a new gum facing prepared by Messrs. Ash & Sons, and which they kindly sent me for trial in its present imperfect but uncompleted state, —the upper set is a fair representation of a pale gum—I had to make a new mix for the lower, but it has not come out the same colour as the upper. If they make it marketable, it has one great advantage over Allen's, it fuses about the melting point of pure gold, and can be baked, as you set it in from seven to eight minutes.

Dr. STACK commended the energy displayed in Mr. Cumming's work and said that it would stimulate him to further investigation in the same direction.

Mr. SHILLINGLAW: Do I understand Mr. Cumming aright to say that he does not bake the tooth in baking the facing?

Mr. CUMMING: No, they are not touched with the fire at all.

Mr. SHILLINGLAW: Then I think we shall be able to use material at a lower temperature, and it will be a very great advantage to us.

Mr. BIGGS stated that after a considerable experience he had been very favourably impressed with Mr. Cumming's method.

Mr. BRUNTON: It is certainly a step in advance, being able to bake without so much heat. There is one question I would like

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to ask Mr. Cumming about the vulcanising of the rubber. Does he find that the pressure in the flask cracks the gum facing, or does he use a flask at all.

Mr. CUMMING: I use a flask, but I may say that the pressure after baking and screwing down the rubber has practically no effect in cracking the gum facing. If the material gets too much of a glaze upon it you will find that when your piece is done it will crack the same as others have done before, and you will find a crack on it, but it will not come off the platinum base, and a few cracks do not matter and when wet are not seen, but the facing is just caught at the very instant when your test piece is right, and then there is little or no tendency to crack. The piece I showed with those perforated holes must not have a great pressure; but, unfortunately, I allowed it to get too hot, and when I took it out there was a peculiar glaze upon it that I know is the forerunner of seeing cracks on it, and the piece, as you see, bears two cracks; the little piece has not been so much done, I do not think there is a crack on it, and the teeth fit better into the sockets. The teeth go direct into the socket and when you vulcanise all the pressure will not force the vulcanite through the necks of the teeth, and it is easily removed.

Mr. ROSS WATT: Does Mr. Cumming find whether the gum is at all liable to be broken in use, by the patient allowing it to fall?

Mr. CUMMING: I have allowed a piece to fall and I fully expected to find the facing cracked, but there is not a crack upon it. It fell into a basin and the water protected it, but if it were to fall abruptly on something very hard I have no doubt it would crack quite as readily as the ordinary gum blocks.

Mr. MARTIN SHERWOOD: I don't know that I quite understood Mr. Cumming with regard to the pressing of the rubber into its place. If that has any injury, why not paint the model and then lay it on warm and wax it up, and then there is no necessity for putting any pressure on the face at all, and it will come out quite as strong as this; I have made several pieces without any wax.

Mr. FINLAYSON: Mr. Cumming deserves the greatest credit for the invention of a gum with the tooth to go in separately, so that any kind of tooth can be used, but evidently the whole of the specimens are under fire as compared with the old process.

Mr. CUMMING: I would like to explain that the process is comparatively new, even with myself, but when I saw that it was workable, I wanted to bring it before the meeting, and I believe

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great improvements can be made on the process, and not a tooth requires to go into the fire at all. No tooth needs to be destroyed with the baking or furnacing.

[Just before going to press, we learn from Mr. Cumming that since reading his paper, he has been fortunate enough to fall upon a process that will entirely, he thinks, prevent the fourth defect alluded to, namely, cracking, *unless by mechanical force.* He is not prepared, however, to make the process known at present, as it is not quite complete.]

A More Efficient Method of conferring Dental Appointments.

By GORDON JONES, L.D.S.I.

Mr. President and Gentlemen,—The subject on which I propose to address a few words to you now was dealt with by me at our last Annual Meeting, but I feel sure its importance is so great that I need offer no apology for once more calling your attention to it. My object is to throw out a few suggestions as briefly as possible, and to invite a full and ample discussion. I think that by so doing I shall be consulting the convenience of this assembly far more effectually and usefully, than by reading to you a long and exhaustive disquisition, following out the subject in all its ramifications. To my mind, what is of importance in these discussions, is to direct the whole force of our attention on two or three proposals, rather than to dissipate our energies in rambling over a vast field of subjects, about which we may differ widely in opinion, and on which, the time at our disposal renders it absolutely impossible to hold any full and fair discussion. Gentlemen, the point I wish to bring before your attention to-day, is this: It appears to me that appointments, as a rule in provincial towns, are conferred on gentlemen having either the largest practices or the greatest amount of influence; therefore, does it not seem an error to ask any practitioner to do conscientiously that to which he has not the time to devote. A dental surgeon ap-

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pointed to a provincial hospital or infirmary, attends for an hour one day in the week—it may be on a Thursday. When he arrives at the infirmary or hospital (as the case may be), he finds a large number of patients waiting to receive professional attendance. The first case that comes under his care is one that the patient says is toothache, he examines the tooth, and finds caries of the crown, perhaps to a very small extent, harbouring food that by its retention decomposes, and is a source of irritation to the patient.

In his own mind a clear case of filling is dictated, but he looks around and sees so many patients waiting, and is cognizant of his private appointments, that, instead of filling the tooth he lays his hand on a suitable pair of forceps and extracts an almost sound tooth. This same patient makes another visit in a few months, goes through the same ordeal and No. 2 tooth is extracted, and this process is gone through till all the teeth are sacrificed to the detriment of the patient's health. Why? Because the dental surgeon has so large a practice that he cannot give (without pecuniary loss) sufficient time, which those poor patients ought to have. What does this mean, gentlemen? It means loss in two ways. Firstly, to dental science in that the vast field of observation which lies ready at hand in the form of numerous patients attending, is not fully utilized, owing to the treating of each case as one of extraction. No practical notice is taken by the dental surgeon of the pathological conditions of each case, hence, that practitioner's mind does not receive sufficient stimulus for furthering the preservative, that is the conservative principle, which ought always to be present in his thoughts. Secondly, does it not seem inhuman to keep a poor sufferer who may be attacked the day after the visit of the dental surgeon till his next visit, because he or she cannot afford to seek proper treatment? In the majority of towns, in which there is an infirmary or hospital, there is sure to be more than one qualified dental surgeon. Why not appoint, if there are six, all of them for different days in the week? Division of labour would benefit the patients, and the dental surgeons, and hence the dental profession. For the status of a profession depends upon the high standing of its individual members *en masse*, and not the highly talented few. I consider if gentlemen be appointed who cannot devote the time conscientiously to their duties they should resign in favour of younger men, who have the time and the requisite experience for treating efficiently the majority of cases presented to their notice: should

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however, complicated or very abnormal cases arise, it should be open to them to fall back upon a more experienced practitioner in the form of the consulting dental surgeon, which appoinment could be conferred upon the gentleman who resigns his appointment, due to his inability to give sufficient time to the requirements of the patients. No appointment to any public institution should be conferred by the subscribers and medical staff of that institution on any member of this profession resorting to that unprofessional system, of advertising. I proceed to quote a case in which I succeeded in obtaining a withdrawal of an advertisement. A certain practitioner who was appointed dentist to an orphan asylum forwarded a testimonial he received from a clergyman to be inserted with his address, &c., in a monthly periodical, which contained an account of the working, financial condition, &c., of an excellent institution to which I am the honorary dental surgeon. Immediately this came to my notice, I intimated my intention of resigning, failing the removal of the said advertisement. I need hardly tell you, gentlemen, this had the desired effect; and if each individual member interested himself to benefit and raise the status of his profession, by appealing to the press to discourage these unprofessional advertisements, much good might accrue in this way.

Since the excellent papers were read by Messrs. Cunningham and Fisher, I have had personal and ample proof of the importance of making a knowledge of dentistry a *sine qua non* in the examination of candidates qualifying for appointments in the Army and Navy Medical Service. Three years ago a naval instructor and chaplain to the fleet consulted me in regard to his teeth, I stopped several and fixed an upper and lower denture; eighteen months after his departure caries attacked one of his teeth to a slight extent. Consulting the surgeon on board for advice, he recommended extraction, and by that operation deprived this gentleman of a very useful organ of mastication. Had this surgeon had some knowledge of dentistry, he could easily have introduced an oxychloride, which would have given relief, and allowed the patient to retain the tooth until he visited me again. I make this statement regarding the competency of the surgeon in this case, because no excuse could be put forward on the ground of pressure of professional work, it being a well known fact that during a pacific cruise their duties are light. In conclusion, though not holding a medical or surgical qualification myself

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(although I have almost entirely completed the curriculum for both, and hope soon to possess them), I consider they should in the future be made compulsory for anyone about to practice the speciality of dental surgery, the same as it is with the oculist and aurist. Now, gentlemen, I invite you to discuss these questions.

The Mechanical Training of the Dental Student.

By GEO. CUNNINGHAM, B.A.Cantab., L.D.S.Eng., D.M.D.

In the interesting and able paper of the Dean of the London Dental Hospital on "Dental Education," at the meeting of last year, he referred but very briefly to the mechanical training of the dental student; yet, curiously enough, a careful perusal of the subsequent discussion shows that it constitutes the main feature of the debate. This latter fact alone indicates very clearly the importance which this Association attaches to this most essential and fundamental branch of the dentists' training, and I think warrants me in briefly offering a few suggestions on the subject for your consideration.

As Mr. Morton Smale rightly said, "It is impossible to overrate this mechanical training, and three years is not a day too long to spend in the workshop to learn and master the minutiæ of the mechanical art, without a thorough familiarity with which it is impossible to be a good dentist." In his hope, however, that the day is far distant when this pupilage will be abolished, we can only concur on the condition that the pupilage fulfils all our requirements. Does it do so? Numerous references in our journalistic literature to this subject seem to indicate that while the provisions required by the licensing bodies are sufficient, and not to be diminished by one jot or tittle, yet somehow or other the system does not result in adequate success. If we admit, therefore, that matters are unfortunately in this sad condition, it would be difficult to employ our time better than in conesidring some

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of the possible causes of this failure, and what measures we may adopt to remedy them.

Mr. Smale pointed out that the hospital career should commence at the expiration of the three years' pupilage. Such a view will be generally endorsed, but if the special dental hospitals permit their students to let the periods of the mechanical and operative training overlap, our own schools must thereby be contributing either to the impairment of one or other, if not of both, from the sheer impossibility of the student giving adequate attention to each at the same time. Not only so, but this facility gives an undue preference to the dentists practising in the neighbourhood of such schools over their more remote confrères.

From the published statements that the certificate of pupilage is given with great laxity and from the possibility of the instructor's neglect or incompetency, we can easily recognise fruitful sources of many failures. There may perhaps exist certain laboratories where complete and efficient mechanical training can be obtained, but I fear they are few and far between, as it must be admitted, their main object, is commercial rather than educational. I think that if we put aside all questions of self-interest which we may have as instructors, we must admit that the present system of pupilage has its drawbacks as well as its advantages. These drawbacks, even where the instruction is not merely nominal but faithful and intelligent, are so inherent in the very nature of the operations executed in the laboratory of the present day, that it is to this fact we must look for an explanation of a lack of mechanical skill on the part of many of our graduates.

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Probably if we discuss the matter with some of the older members of the profession they will dilate on the good old times when a seven years' apprenticeship was the rule rather than the exception, when the conveniences of vulcanite were as yet undiscovered, and when the facilities of the dental depôt with their supply of ready prepared materials were almost unknown.

No one can dispute that in past times the education of the dental apprentice was indeed a mechanical training. Whatever advantages we as actual practitioners may obtain from the present condition of affairs, the result seems to have been a loss of thoroughness and completeness of the dental laboratory as a school of mechanical training.

Mechanical trades, as a rule, have usually a certain finish and distinctness in themselves, whereas in the dental laboratory we

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have, as it were, a little bit of this and a little bit of that trade or art applied to our special purposes. The number of the various mechanical trainings, as well as the extent to which these are so utilised, vary with the excellencies, the accomplishments, and oft times the idiosyncrasies of the practitioner or his principal assistant. The result of all this is, that the dental pupil gets a certain amount of education in the performance of a variety of mechanical operations without obtaining that, which regarded from the view of the so-called mechanical trades, constitutes a complete and thorough mechanical training. To this, in our opinion, may be ascribed the principal cause of failures in our mechanical education, and this naturally leads to a consideration of how we can best remedy its defects.

A contemplation of the present condition of the English mechanic may help us in solving the difficulty. The lack of comprehensiveness in his training, the multiplicity of inventions in the way of time and labour saving machines, and the better education of his foreign rival, have led to a decadence which has at length demanded the attention of the Government of the country to such an extent that a governmental scheme of elementary technological instruction in connection with H.M. Science and Art department, will soon be added to the various other similar institutions already established by our universities and other bodies, such as the City of London Guilds. This manual instruction of the youth will be of great service to parents as well as our profession in giving us some means of testing the value of the "raw material" offered for assimilation as pupils. This would seem to indicate the lines upon which our mechanical training may be made thorough and effective without even necessitating any alteration in the present conditions required by the Medical Council and the licensing bodies.

My main proposal then is that the whole of the time of the dental pupil should not be exclusively passed in the dental laboratory, but that where suitable institutions exist, a tangible part of each day, or even of alternate days, should be spent in attendance at some practical and allied courses of manual technology or in a practical school of mechanics.

The conditions and the actual courses followed must vary according to the various opportunities afforded in the different parts of the kingdom.

I referred last year to the fact that a dental pupil in Cambridge

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had found it possible not only to follow out his pupilage, but at the same time to take his degree at the University. That his pupilage was a success I have every reason to believe, and that his degree was an honourable one is evidenced by a first-class in his final examination. It is only right to remark that the degree was an ordinary one, and that it would be impossible, except under very special circumstances, for a student to successfully complete his pupilage and at the same time to take an honor's degree. The gentleman to whom I refer, after passing his previous and general examinations for which no attendance on any special lectures is required, took up political economy as his subject for the special or final examination. Without detracting in any way from the achievements of this gentleman, or from the advantages obtainable from the study of so important and so interesting a subject as political economy, I may be allowed to state that from a professional view the best use had not been made of the opportunities at his disposal in the University. A school of practical mechanics exists, and thanks to the self-denying efforts of Professor Stuart and his able colleague Mr. Lyon, both of them University graduates, this has become widely known for the efficiency and thoroughness of the mechanical training which may be there obtained. I feel quite convinced that any dental student who followed out the course, or parts of the course, in that school coincident with, or antecedent to, his dental pupilage, would be more efficient as a practical dental mechanic than if all his time had been wholly spent in the dental laboratory.

I have drawn up in the form of an appendix to this paper a syllabus showing the training, with specimens of examination papers, and a scheme to prove how he would not only have the benefits to be derived from such a scientific and practical course of training, but further acquire the distinction of a University degree, and thereby contribute largely to raise the profession in the eyes of others.

It is often interesting to notice how one's views strike those outside our profession. In any training that pretends to be a mechanical training you must treat with a great amount of consideration the opinion of experts, and as there is such a thing as a kind of grammar which must be common to all mechanical trades, it may not be uninteresting to hear what such an eminent teacher of practical mechanics as Mr. Lyons says, and to see the encouragement afforded by the authorities in Cambridge, and I have no doubt similarly in other centres.

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His letter is as follows:—

Engineering Department, Cambridge University,
August 16*th*, 1887.

DEAR SIR,—I have read with great interest, your paper on the training of the Dental Student, and I see at once that the same difficulty has presented itself to you in your own profession which met me in mine, viz., that the defective technical training of students in commercial establishments is due to the fact that these places exist for the purpose of making money and not for training students. Special courses are already arranged in our department to meet the requirements for special students, such as those who intend to emigrate or follow architecture, or law agency work, and I see no reason why it should not be possible to arrange a special course for dental students, which might embrace the making of their own instruments and the principal features of electrical work in addition to the general mechanical principles which are taught practically to all our students. After reading one of your text books on mechanical dentistry, and discussing the question with you, I am of opinion that the experiment which you advocate is a most valuable one and must be successful.

I am, very faithfully yours,
JAMES LYONS,
Superintendent.

G. CUNNINGHAM, Esq., B.A.

I have also consulted one of the examiners in Mechanism and Applied Science of that University, the possessor of a name which will be familiar to you all. This letter is from a son of the celebrated Charles Darwin, who is becoming celebrated as one of the most fertile inventors of the day. Any one who is acquainted with the interior of any physiological laboratory in the world must know the name of the Cambridge Scientific Instrument Company, and many of the instruments found there are due to the invention of Mr. Darwin. When I first broached the question to him, he was rather inclined to be antagonistic; but after mature consideration of the points advanced in this paper he gave them his warmest approval, so that his letter is all the more satisfactory. He says:—

August 17*th*, 1887.

I have been much interested in your paper, and the suggestion you make, that part of the Dental course of instruction should be spent in the workshops seems to me important. A student who had passed some time in such a workshop as we have in this University would have cultivated the dexterity of his hand in a way that would be advantageous to him both in mechanical work and in operating. This would perhaps be of even greater value than the knowledge he

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would obtain of the use of tools and machines, and the nature of the materials with which he has to deal. As you know, I have taken some interest in the tools and machines used in the profession, and it seems to me that a dentist should be, among other things, an engineer, and to do this he should have had some experience in a workshop. If this mechanical training came early it would, I think, also have the advantage of convincing some of the students that they had made a mistake in the choice of their profession; for if they could not do skilled work on metal when held in a vice, they are hardly likely to be successful in the more difficult operations necessary afterwards. Such mistakes are made in the choice of a profession, and it is well that they should be found out early. I hope you will be successful in advocating this form of training.

Yours very truly,
HORACE DARWIN.

Dr. CUNNINGHAM,
King's Parade, Cambridge.

It has been well remarked by Mr. Huxley and others, that the lectures on mechanical dentistry and dental metallurgy should be taken during the time the student is working at the subject practically, and not as now, during his period of operative dental study. The fitness of this suggestion must be admitted by all, but inasmuch as a very large, if not the major part of dental pupilages are passed in places where facilities for adopting this proper mode of study are not obtainable, it is not universally practicable unless we have some modification of the present system. It might very easily be made practicable by the transfer of the third year of pupilage to a centre where the facilities exist, or what in my opinion would be better, to a dental school and hospital where the training would be both theoretical and practical.

Mr. Smale does not approve of the "open" or American practice of teaching mechanical dentistry at the dental school; firstly, "because we find enough to do at our schools to teach the operative part of our profession, and, secondly, because the mechanical part cannot be taught in classes as thoroughly, or as well as under the personal supervision of a skilled mechanician." With regard to his first contention, an increase in the staff of teachers would solve that difficulty, and the adoption of the provident system of fees for the appliances as already successfully practised in both German and American dental schools, would effectually dispose of the economic question. With regard to his second objection, I do not think he is aware of the mode of conducting mechanical education in America in the dental schools, otherwise he would

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not have made the statement that he would be sorry to see the American plan adopted. Passing over my personal experience in the matter, I may refer to the case of a member of this Association, who, after successfully earning his living for some years as a mechanical assistant to the satisfaction of his employers, on going to an American school, not unnaturally, demurred at the necessity of following all the exercises of the mechanical department, and yet is now ready to admit all the unexpected advantages he derived from that course, and some of which he evidenced at a clinic before this society. In fact, it is not too much to say that the very opposite of Mr. Smale's statement may be maintained, or at any rate his statement modified into this,—that some parts of mechanical dentistry can be taught in classes more thoroughly and better than under the personal supervision of a skilled mechanician. One example may suffice as proof: Under a skilled instructor the class is divided off into two for practice in model taking, each student in his turn, therefore, exercises the double *rôle* of impression taker and patient. I do not know which experience is the more useful, but they are both excellent. I should like to know how many of those who, having completed their dental pupilage under the English system, are adepts in model-taking in all materials, including plaster of Paris. It is impossible to suppose, except in rare cases, that a dental pupil under ordinary conditions, can acquire such a knowledge of the various methods and appliances used in correcting irregularities of the teeth and in remedying such defects as cleft palate, as may be obtained in a class with practical exercise in applied cases in the mechanical department of a dental school or hospital, under the personal supervision not merely of a skilled mechanic, but of an able instructor who is a specialist in his own department of dentistry.

Mr. Smale holds that a practical examination in the mechanical department should form a part of the ordeal to be passed, before the student obtains his coveted diploma. I trust this Association will cordially support such a proposition, as thereby it will be the sooner carried into force. This proposition, however, seems to me only another very strong reason why the dental student should be furnished with an opportunity of remedying the possible defects and deficiencies of his private pupilage by the proposed optional and public course of one year in a dental hospital and school. Some such arrangement, as I have just indicated, would combine

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the advantages of the school system with that of the present form of pupilage, and certainly would do much to promote the efficiency of the L.D.S. diploma, which after all must ever be the essential qualification for a competent dental practitioner.

Mr. Morton Smale: I feel, gentlemen, almost obliged to rise first in this discussion, because my name has been brought in so often in connection with the remarks Mr. Cunningham has made. We are all agreed that the more thorough the dental student's training the better; but we are met with several difficulties. The first one is the overlapping of the mechanical dentistry and the course at the Dental Hospital. The College of Surgeons requires that from the date of registration the student shall have been four years in the acquirement of professional knowledge. How he is to pass those four years the College does not say, except that for three of them he shall have been employed in the details of mechanical dentistry, and for two of them he shall have been attending the Dental Hospital training. Thus they virtually provide for five years. When a student comes to me and says, "The College only wants four years and you point out that I ought to take five," I have to say, "It is possible, if you let the courses overlap, that you can take the diploma in four years." This position I heartily regret, but I cannot help it, and I do not think you will ever get the College of Surgeons to alter it. They think that four years is all they require for a man to get his licentiate ticket for the College of Surgeons and Physicians. They will not, therefore, increase their length of curriculum for the dental student, and without an increase it is absolutely impossible to have thoroughly trained men. With regard to the observations made about science centres and Cambridge degrees, I can only say that nothing would give me greater satisfaction than to see a great central teaching school in London, where students might learn every branch, and I hope the time is not far distant when there will be such a thing; but I think that attendance thereat must be a purely optional thing. So far as the hospital training is concerned, I think that the two courses on mechanical dentistry given at our school would provide all that the students could require, if they had spent three years previously in their laboratories, and had worked there as they should have done. In addition to this, however, the student in our school is re-

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quired to make a pivot tooth, and to treat four cases of irregularity in the two years. He also treats cases of cleft palate, under the lecturer, and under the demonstrator of mechanical dentistry recently appointed. Nearly all, therefore, that Mr. Cunningham has referred to is provided at our school in London.

Mr. PEARSALL (Dublin): As one who has spent some time in examining students, I would like to say a few words. Nothing has struck me more forcibly than the absolute want of proper mechanical training in a great number of the candidates that I examine. I speak both of young and old men. I have gone so far as requiring men to prepare copper wires, and have asked them to make fastenings for me and put a pin in a plate and tap a tooth. The number of men who were frightened at having to do those ordinary operations was past belief, and I had to make a large allowance for those men's nervousness, but I always succeeded by a courteous manner in making the candidate feel that I wished him to be at his ease, and that I did not want to stick him at all. I had seven years as an apprentice and fourteen as an assistant, and I am perfectly certain that a man who has his fingers trained makes the best dentist. I have heard the statement that we shall have no more mechanical dentists. In Ireland, at any rate, matters are different. There we have to help ourselves very much, and in spite of Mr. Smale, I am prepared to say that we cannot get as good swivels made as we can make ourselves.

Mr. THOMAS GADDES (London): I am quite at one with Dr. Cunningham in the general subject of his paper. I have had a good deal to do with dental students, and I have found in a great many instances few men capable, as far as mechanical dentistry is concerned. A great improvement needs to be made in the teaching of mechanical dentistry, and I think the first stepping stone is with regard to the examining bodies. There are many subjects in the curriculum that the student has to stand up for, on which he is not asked a single question, and the result is that the student altogether ignores the subjects that are so treated by the examining boards. I think the first way to make an improvement is that the examining bodies should make the subject of mechanical dentistry a part of the examination. So far as attending some engineering classes, I can say something of the advantages of such a course. I myself had four or five years' training in practical engineering, and when I went to serve my apprenticeship as a dentist, the training that I had received was of inestimable

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value to me. Therefore, I say from my own experience, that if opportunities were placed in the way of our dental students receiving some course in a practical engineering shop, it would be a very great advantage, and would tend to raise the mechanical aspect of the profession of dentistry.

Dr. SMITH (Edinburgh): I am one of those old practitioners who remember the time when the mechanical work was paramount in the education of the dental student, and I entirely concur with those gentlemen who have spoken, inasmuch as the acquirements of the dental assistant in those days, when the old bone work was in use, when we made our own swivels and bolts and springs and many of the instruments, were of a much superior order to what they are at the present time, and I think that it would be a great advantage if mechanical experience of some kind could be imparted to the students. I think that the principles of mechanics ought to be acquired as much as the details of the more technical departments of dental mechanics. I cannot see very well, as Mr. Smale has remarked, how more time could be devoted to mechanical dentistry and the same time given to dental surgery. As regards the examination in mechanical dentistry, I do not know how it could be carried out to any great extent, because we could scarcely ask a man to take an impression and finish off a set of teeth before the examiners, but upon the principles candidates are always examined. I am glad to say that there are very few men who come up to the College of Surgeons in Edinburgh who cannot give good answers to the questions. The questions and answers are kept, and any one is very welcome to see both papers, and if he does not say that the majority of their answers is of a very high order indeed, I will be very much surprised. I am very glad to have an opportunity of making a statement of this kind, because I think it should be known that in Edinburgh the Royal College of Surgeons are most strict in examining on these subjects.

Mr. BIGGS (Glasgow): With regard to the Faculty of Physicians and Surgeons in Glasgow, the students are examined in all the branches that Dr. Smith and others have referred to, materia medica, medicine, chemistry, mechanical dentistry and metallurgy. I am sure that it is quite a wonder to us all that these have not had examiners in the L.D.S. of England.

Mr. CUNNINGHAM: Mr. President, there is no statement of that kind. I was speaking of the distinction between an oral examination of mechanical dentistry and a practical examination.

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Mr. BIGGS: It is both oral and mechanical in Edinburgh and Glasgow. We take the students to the Dental Hospital and cause them to take impressions and models, and fix up sets of teeth on models of vulcanite. We have no time to give them gold work to do, but we see that they know the whole process and how to set up upper and lower models in wax.

Mr. A. WILSON offered some remarks in corroboration of those made by Dr. Smith, and further suggested that dentists should make it essential that their pupils should be with them for three years in the workshop before entering on their surgical work. He also stated that in Glasgow and Edinburgh the college allowed one year of mechanical dentistry to be taken after the preliminary examination, and that there was no necessity for any overlapping at all.

Mr. FOTHERGILL spoke on the plan followed in the American schools, where a student was given a patient and required to make a vulcanite case for her and show it to the examining surgeon. He expressed a preference for the English system, though he believed the American schools had many advantages.

Mr. SMITH TURNER: I remember working with natural teeth, when mineral teeth were almost a rarity, and having to make my own tools, and I thank Heaven that those days of drudgery are past. I never saw any beauty or utility in them, and I do not think I am any better dentist for having had to go through them. I think that the training of a man who has to practise as a dentist, should be, as Dr. Smith very pointedly remarked, a training upon principle as much as upon detail in dental mechanics, as usually understood, and for this reason I do not think a man working, whatever his knowledge may be of the workroom and of the details of the work, can combine the two. I will ask any one here, if he knows anything about striking up plates and doing the hard work of the dentist's workroom, if he is fit to leave that work and do the delicate manipulation that is now required of us in our surgeries. I say as one who has had no little experience that it is impossible. Not only will his hand be unsteady, but his delicacy of touch will be gone, and he will be unfit for either the one or the other. Now if a man is to conduct a practice, he ought most certainly to know the details of the workroom. He ought to know how things should be done, and in a push he ought to be able to do them, but that he has to keep the two up together or that he is to be trained to that extent of skill, which a

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mechanical dentist whose place is in the workroom requires, is, I think, out of the question. How he is to get his proper training is a matter which it is very difficult to settle—I mean the dentist who has to go into practice as a dental surgeon. The question of apprenticeship has always been a vexed one, because as has been shown by all speakers you have no control over your apprentices. The system of apprenticeship was done away with in the medical schools for that very reason, that an apprenticeship was more often a fraud than anything else, so it will be, I believe, in the dental profession as often a fraud as anything else. If the young man, the student, refuses, as Mr. Smale says, to learn to work, the interest of his teacher will very soon flag and he will be glad to get rid of him. With regard to the examination of the College of Surgeons, it is very far from being perfect, but it is about as severe as we can make it. I am afraid if we made it much more severe, the result would be that a great many people would be plucked, and with regard to the examinations that are made elsewhere, my surprise is that anybody ever gets through. This question of teaching dental students a perfect knowledge of dental mechanics will arrive some day at a satisfactory condition. At present it seems we are rather adrift, but I think we must try to particularise a knowledge of principles and make it as limited for practical purposes as we can.

Dr. STACK drew attention to the absence of any mechanical training as a part of general education in this country, and cited the case of Germany where every boy is trained to some mechanical occupation. He also referred to what he considered insufficient attention on the part of dentists to their pupils. With regard to practical examination, he explained that the College in Ireland made it a practice to take the student into the laboratory and make him do some simple mechanical work.

Mr. BRUNTON expressed the opinion that the question of technology and arts was one that would cure itself to a great extent, seeing that technical education was being introduced into many schools, and that school boards were taking it up. He believed it was a question which would belong more to the school than the college.

Mr. CUNNINGHAM: In the course of the discussion a great many questions have been put, but I think it would be a vain effort to answer them all. There are only one or two points which I would notice. I think I was justified in the main object

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of my paper, which was to show that the mechanical training of the dentist is unsatisfactory. Nobody could have listened to this discussion and still maintained the contrary. What are the causes that have led to that? I have certain views as to that, and Mr. Smith Turner, a very important authority, refers to the good old days of drudgery. They were days of drudgery, because he was kept at one special operation perhaps week after week. He endorsed what Dr. Smith has said, and from his speech it might be inferred that I never had mentioned the subject, but there is a grammar of mechanics which is as common to engineering as to mechanical dentistry. With regard to the American experience, I am very sorry that I had to mention one word about that, because I know just as well as anyone can do what the weakness of the system is, but it is unfair to touch upon men who dodge, and with regard to these bad students, as Mr. Morton Smale says, we cannot get rid of them. The system should not be judged by them, and I can only say that if Mr. Fothergill had had the opportunity of seeing the same work as I had, he would rather tend to commend the good points of the American system, and I would advocate as a practical change two years of the English system with one year of the American system. Yet that American system is in practical use in the London school and it is not known as such, and, therefore, when he confesses that he has adopted the method which he has condemned, it is the most practical admission I could expect. What we want to have is a system that will make up for the deficiency of the laboratory. With regard to the examination in mechanical dentistry, there are one or two points. I think we have had a good examination in practical dentistry. You may lock a student up in a room and give him as much time as he wants and if the work is stringent it can be done, but it is not necessary to be done. I have an examination paper in an engineering shop, and if you listen to the practical examination that they have, you will be of my opinion that there is not one of the practical questions that it would not be good and useful for a man to possess, who pretended to be a mechanician, which I hope every dentist will. The examination is as follows :—

(1) Bore the cylindrical gauge and turn the plug to fit it.

(2) Turn the given piece of steel to $\frac{5}{8}$ in. diameter, and cut a V thread on it 2 in. in length.

(3) Temper the chisel and turning tool.

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(4) Chip the given block of cast iron to as level a surface as possible.

(5) Make a box with dove-tailed corners to sketch.

(6) File up the given hexagon nut.

(7) Mould the given patterns for an iron casting.

I think if a candidate would get a tool to sharpen, he would find out something to his advantage. Of course there is a comprehensive examination, and the time is from nine to one and two to six, and the student has to do what he can, and I think it would be well if a man went through some training that would enable him to pass such an examination as that. I scarcely think that a similar practical examination would be advisable for the mechanical dentist, but we should compel him to do certain parts of the work that would test his knowledge of the whole process. Then another point is this; you know that there are men practising dentistry to-day, who are better calculated to adorn some other profession, and a training of this kind would enable men to find out whether they were suited for dentistry or not. Mr. Brunton sent me a young man, who had been with him as an improver. After a month I said he had better go, but my brother asked that he should be allowed to remain for another month, and after another month my brother came to me and said that we must put him out of that, and I told him to go back to his former profession as I did not believe he would ever make a good dentist. We ought to prevent these men coming in. One point I want to enforce is a training in those essential elements, not the sort of technology that they get in school. Any man can do it in his own place. In my own case I was trained with wood work and files, and I was not allowed to operate till I made my own instruments. I thought it hard, but I think it is a good training. I think that a mechanical training will be an economy of time, and I only hope and trust that those who have seen the work turned out at Cambridge will appreciate the advantages of the special school. I am not wanting to advocate Cambridge as against any other. I have only wanted to talk about something I was not ignorant of.

A vote of thanks to Mr. Cunningham was moved by Mr. Smith Turner and seconded by Mr. Gordon Jones. After which the meeting was adjourned.

In the evening the President and Mrs. Brownlie received the members of the Association and their friends in St. Andrew's Hall, Berkeley Street.

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Friday, August 19th.

Annual Meeting of the Benevolent Fund.

Mr. J. R. BROWNLIE (President of the Association) in the chair.

Sir EDWIN SAUNDERS, in the absence of Mr. Woodhouse, read the report of the funds as follows:

GENTLEMEN,—As it is quite out of my power to be present at your meeting, I am obliged to make my statement of the financial condition of the Benevolent Fund of the British Dental Association in writing.

I will first state our circumstances, and then point out the special subjects of interest in the report. Our income during the year, ending June 30th, was £369 6s. 4d.; of this £81 5s. 4d. was from donations and £288 1s. from subscriptions. Added to this we had £152 8s. 11d. in the Bank at the commencement of the year, making a grand total of £521 15s. 3d. Of this sum we were obliged by our laws to invest £50, that amount being made up of donations of £5 and upwards; besides this, we have invested another £50 for which there was no immediate need, making together £100. We have expended £180 11s. 10d. in benevolent allowances, being £31 more than we disbursed in this way last year. Our printing and stationery account amounts to £1 5s. 6d., and postage and miscellaneous expenses to £4 9s. 6d.

We have £210 13s. 4d. in the Bank and £24 15s. 1d. in hand. Our income last year was £91 13s. 5d. greater than in the previous year, the amounts being £277 12s. 11d. to June 30th, 1886, and £369 6s. 4d. to the same date this year.

Our invested capital is now £863 5s., which last year yielded an income of £20 4s. It is very satisfactory to see this, as it is an assurance of the stability of the Fund, but the Committee are quite prepared, instead of investing, to expend all the income they are at liberty to part with, in benevolent allowances, should suitable cases arise, but they always feel that they must have something to fall back upon until the year is ended, for any urgent cases that may come before them.

The details of the expenditure I will leave to the Hon. Secretary to give, as he is brought more immediately into contact with the individuals than I am, and on him devolves the trouble and difficulty of finding out if they are deservingof the help of the Fund—no light or pleasant work, you may be assured. Suffice it for me to say that we have been able to continue the aid to those we had already helped, and have added others to our list. A statement of the financial progress of the Benevolent Fund since its commencement has been kindly drawn up by Mr. George Tawse, who has from the first acted as Honorary Accountant for it. This will be found elsewhere, and shows the sub-

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BENEVOLENT FUND OF THE BRITISH DENTAL ASSOCIATION.

Dr. BALANCE SHEET AS AT JUNE 30TH, 1887. **Cr.**

Donations					£81	5	4	Benevolent Allowances	£180	11	10
Subscriptions—1885 ...	£6	6	0					Postages and Miscellaneous	4	9	6
„ 1886 ...	101	0	0					Printing	1	5	6
„ 1887 ...	160	11	0					Investment of Capital	100	0	0
					267	17	0	Bank of England, at June 30th, 1887 ...	210	13	4
Interest on Investments					20	4	0	Cash in hands of Secretary, at June 30th, 1887	24	15	1
Bank of England, at July 1st, 1886 ...					148	4	11				
Cash in hands of Secretary, at June 30th, 1886					4	4	0				
					£521	15	3		£521	15	3

5th August, 1887.—We have examined the Books of the Benevolent Fund of the British Dental Association with the Vouchers, and hereby certify the above Balance Sheet to be correct.

(Signed) W. F. FORSYTH, ASHLEY GIBBINGS, } *Auditors.*

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stantial growth it has made, as the Report of the Honorary Secretary illustrates the extended benefits it is conferring on our necessitous brethren.

I am sure it must be most satisfactory to the subscribers to the Fund to see how very small a sum is necessary to carry on its operations, only £5 15s. being the total expenditure for the year for printing, stationery, and postage. I trust that in other respects the report may have your approval.

A. WOODHOUSE,
Treasurer.

In the unavoidable absence of Mr. George Parkinson, Mr. S. J. HUTCHINSON read the Committee's report as follows :

Your committee beg to submit to the contributors of the Benevolent Fund of the British Dental Association their fourth annual report.

The Honorary Treasurer's financial statement, duly examined, and certified by the auditors, extends from the foundation of the Fund in 1883, to the end of the present financial year, June 30th, 1887. Sir John Tomes having resigned his Presidency of the Representative Board, is succeeded by Mr. Smith Turner as ex-officio Chairman.

The general business brought before your Committee during this period has been on the increase, comparatively with past years. The number of children being educated at the expense of the Fund are eleven ; these children are placed at good, but inexpensive schools, in various parts of the country. Two boys whose mothers were left totally unprovided for are placed at a school at Dover, where they are receiving a good education, and are well and happy. Two children, members of one family whose mother was left in a very destitute condition, are placed at a good school at Herne Bay, and were it not for the existence of this Fund their education would have been entirely neglected ; the mother also has received very material help, and is now, with the aid of an elder daughter, making a very fair living by dress making. The father of this family was during his life time a most respectable practitioner, but being cut off very suddenly, he was quite unable to make any preparation for the support of his family, and when their case was first brought before your Committee they were on the verge of starvation.

Two children are being educated at schools in Gloucestershire, the mother thereby being able to make her small annuity cover her expenses, but if these children had not been educated for her, they would have been quite neglected and the mother probably unable to make her way in the world.

One child is being educated at Brighton, one at Windsor, two at Louth, one at Blackheath, one at Sunderland, in all these cases children are being fitted for a useful life and we are materially lessening the pinch of poverty at home.

Seven widows are receiving in several cases weekly allowances, or

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are being otherwise substantially helped in their struggle for existence.

In one case of a widow, she has had a "Singer Sewing Machine" (the property of the Benevolent Fund) lent her, by the help of which she is able to make a living, and for which she is most thankful; she was in an utterly destitute state when your Committee first heard of her. All the other widow recipients of your charity are most grateful for the help extended to them, as their letters and personal thanks constantly testify.

Three dentists who have entirely broken down from ill health and other causes, have, after the most careful and searching investigation, been greatly helped to tide over pressing difficulties, and aided a good deal to future prosperity. In one case of a dentist, your Committee paid arrears of rent, and advanced money to redeem tools and instruments, and with the addition of a small weekly allowance entirely set him on his legs again. In another case, your Committee are endeavouring to help a dentist who, by some unfortunate bill of sale has entirely lost every thing he had; he is a most deserving and respectable person, a non-advertiser, but has been almost ruined by unscrupulous and advertising competitors; this case is now under the consideration of your Committee. The foregoing are fair samples of the cases brought annually before your Committee.

Had the amount of our funds permitted, your Committee could have in many cases more substantially come to the rescue, but they have been obliged to use great economy and care in dealing with them.

Your Committee would earnestly appeal to the profession for more support, especially by annual subscriptions and donations, as the amount of suffering amongst our poorer brethren is only known in most cases to themselves and those who investigate their positions, and are often heartrending and very sad, generally through no fault of their own, but from a combination of circumstances over which they have no control and which, by a little timely aid, can be tided over or removed.

Your Committee would allude with great satisfaction to a donation from the Western Counties Branch, in accordance with a suggestion of Mr. Browne-Mason (of Exeter) its president last year. This is in addition to individual subscriptions and is a most welcome innovation and an example your Committee trust will be followed.

In accordance with Rule XX., this annual report is now offered for your approval and acceptance, and a list of contributors has been prepared and is now open to your inspection prior to publication.

In conclusion, the best thanks of the Association are due to the auditors, Messrs. Forsyth and Ashley Gibbings, for their kindness in again auditing the accounts, and also to Mr. Tawse for his generosity and kindness in again gratuitously preparing the balance sheet, which is now presented to you for your approval.

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The PRESIDENT: From what we know of our Treasurer and Secretary of the Benevolent Fund, I am sure you will all agree with me in saying it must be a matter of great regret that they are not able to be present to-day, and that no one must think for a moment that it is through any lack of interest in the work that they are not with us. Both the reports are of the most gratifying nature, and I am sure will meet with your approval. The work has been carried on in the most satisfactory manner.

Mr. BROWNE-MASON (Exeter): I have very great pleasure in rising to second the motion for the adoption of the report. I think from what we have heard that it is in every way exceedingly satisfactory, and I take this opportunity of handing over the cheque of ten guineas that my branch commissioned me to bear to you to-day. I think it may be pleasant to hear that at our Annual Dinner of the Western Branch one of the President's guests, an outsider, gave me a cheque for one guinea, which I also hand over to the Treasurer.

Mr. HUTCHINSON: I have now to announce that in accordance with the bye-laws of the Society, one of which I will read bearing upon the case, Messrs. Waite and Dennant retire as members of the Committee of Management. I think Mr. Dennant was one of the inaugurators of this fund, and he has taken the most complete interest in it, and has come up from Brighton constantly to attend our meetings, and has discharged his duties as Vice-Chairman in the absence of Sir John Tomes with great interest, and I think we owe him a debt of gratitude. Dr. Waite has been also very kind in coming to our meetings, whenever there have been meetings of the Representative Board, and I am sure you will be sorry, as we are, to lose the help of his wise counsel and his good judgment. The bye-law to which I call your attention is as follows:—"The affairs of the fund shall be conducted by a Committee of Management, consisting of ten members, and composed as follows: The President for the time being of the Representative Board of the British Dental Association (if he be eligible as a contributor to the fund), the three Trustees and six contributors to the fund of a sufficient sum each to entitle them to vote being also members of the British Dental Association, two of whom shall be members of the Representative Board of the Association.

"These last-mentioned six members may serve for three years from the date of inauguration of the fund, at the expiration of which period *one-third* of the members shall retire according to seniority of election. After the third year *one-third* of the members shall retire annually according to seniority of election, and shall not be eligible for re-election until the expiration of one year."

On the proposal of Mr. MORTON SMALE Mr. Fenn Cole and Mr. Browne-Mason were elected to fill the vacancies caused by the retirement of Messrs. Dennant and Waite.

In reply to an enquiry whether the fund were confined to the relief

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of members of the Association, Mr. HUTCHINSON stated that it was available for all registered practitioners, their wives and children. He also announced subscriptions of one guinea each from Mr. Martin Sherwood, Mr. G. W. Yates, Mr. John C. Story, Mr. G. Campion, and of a half guinea from Mr. Payling. Mr. Morton Smale had given a donation of ten guineas, accompanying it with the suggestion of a Jubilee collection for the fund. In connection with this suggestion, Mr. Hutchinson called attention to the fact that the invested funds were £863, and urged the desirability of raising them to £1,000.

Dr. STACK offered ten guineas provided twelve other gentlemen would give the same, and Sir Edwin Saunders expressed his readiness to join Dr. Stack. Mr. Shillinglaw gave a Jubilee donation of a guinea.

A vote of thanks to the officers of the Fund was proposed by Mr. WILSON and seconded by Mr. BROWNE-MASON, and carried unanimously.

Thanks were likewise voted to Messrs. Forsyth and Ashley Gibbings who had acted as auditors.

Mr. RICHARD ROGERS proposed, and Mr. BRUNTON seconded, a vote of thanks to the Chairman, which the President briefly acknowledged.

At 11 o'clock the reading and discussion of papers was resumed.

The Value of Antiseptics in Dental Surgery.

BY E. LLOYD WILLIAMS L.D.S.ENG.

Mr. PRESIDENT AND GENTLEMEN,—I make no apology for introducing this subject before the Association, because I am convinced of its importance, not only in its purely scientific aspects, but more particularly in its practical bearing upon the every-day work of modern dentistry; and to the later consideration I intend addressing myself exclusively.

There is probably no one of those listening to me now but uses antiseptics in some form or other; but whether we all work on consistent and sound principles of antisepticism is quite

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another thing altogether. It will be my endeavour, in so far as the limits of a short paper permit, to touch upon the broad principles which should rule over our practice, and to suggest a few special points of treatment which have been found valuable, rather than to formulate any hard and fast laws, or dogmatize upon pet theories and particular methods.

The debt of modern surgery to Sir Joseph Lister is difficult to gauge; but we are apt to lose sight of the fact that we owe less to what is known as strict "Listerism," than to the great doctrine of "cleanliness" which underlies all the teaching of that eminent surgeon. The fact that to-day modern surgery can boast of operative triumphs undreamt of, still less attempted, by the practitioners of but a short while ago, and this in spite of much variety of procedure, can only be accounted for in one way. The great principle which regulates all operations and which has been the very foundation of success, is "absolute surgical cleanliness." I fear that as dental surgeons we have even yet scarcely grasped the importance of this principle. It is true that our sphere of surgical work is limited, that we are concerned for the most part with hard tissues which we look upon as being comparatively indifferent to external conditions; but we must not forget that even in the simplest operation we have to do with living material, not to speak of those branches of our work where we are brought face to face with ordinary surgical conditions, and where the result of our treatment is wrapped up with the constitutional welfare or woe of our patients. Nature stands more insult in the mouth than in any other part of the body, and her long-suffering has admitted of much reckless treatment with comparative impunity. There is probably no operation on any part of the human body commensurate with that of wrenching a tooth from its bony socket where the repair is so rapid and the after effects so slight. If this were not so, we should probably approach the mouth with a far greater degree of caution, and should employ every possible antiseptic precaution for procuring a minimum of local and constitutional disturbance. But it yet remains to be proved how far we can improve upon our present results by being more cautious; and I feel confident that in special cases antisepticism must lead to more brilliant results if carried out with thoroughness. There is another side to the question which must not be lost sight of. It is well for us that there are so few recorded cases of inoculation from the mouth, but that is no

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reason why we should employ dirty instruments. It is idle to tell me that we run no risk. If we take the case of syphilis alone and remember that the virus may be propagated through the medium of the secretions of all the secondary eruptive lesions, especially of the mucous patches and various forms of ulceration so common about the mouth, as well as the blood during the entire period of the secondary symptoms, it ought surely to teach us caution. And this is a point which affects us as operators equally with our patients, for many a medical man has sacrificed his health through contracting syphilis from a patient; and I understand that we as dental surgeons have not been entirely free from the same terrible accident. How far the absorptive properties of the mucous membrane of the mouth are concerned in the spread of specific contagious diseases would be a question at once difficult and yet interesting to follow. How far local suppurative conditions of the mouth are communicable through the medium of dirty instruments is another question, which would doubtless be followed with much misgiving by the majority of dentists.

Cleanliness then should be an elementary, but essential, principle of our practice. All our instruments should be not only clean, but where at all likely to come into contact with the soft tissues absolutely aseptic. I have for some years adopted the practice of cleaning *all* instruments with a one in twenty solution of carbolic acid; all the members of my outfit have their antiseptic bath, from mouth mirror down to rubber dam. All files, scalers, excavators, &c., likely to come into direct contact with the soft tissues are dipped into carbolic oil or solution *immediately* before being used. Nerve extractors and bristles are dipped in pure carbolic acid just prior to using. The same portion of waxed silk or twine is never used for a second person; nor the same wedge made to do duty for half a dozen people. I will not weary you with further details; suffice it to say that as far as possible I carry out these antiseptic precautions down to the smallest particular. I do not profess to obtain more brilliant results than my brethren who think all these precautions superfluous; but I feel convinced that I am on the winning side, and though the differentiation of result be slow to assert itself, yet the principle must be right, and the revolution which is taking place in this direction in every branch of surgery can scarcely be allowed to leave our own specialty in the wake. I put the question per-

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sonally to every member who listens to me, and say, "Would you allow your own dentist to plunge a nerve bristle fresh from its work on a putrid pulp straight into the pulp of one of your teeth?" or, "Should you sit down calmly and have your teeth scaled with instruments which last did their work in the mouth of a secondary syphilide?" If not, the moral is obvious. Shall we continue to drum into our patients' ears the gospel of cleanliness, and yet refuse to apply its commonest tenets to our own professional practice?

So much for the general principle which is prophylactic rather than remedial, but we must now pass on to consider in what special ways the use of antiseptics may prove useful to us in our work. It is quite unnecessary to define the strict meaning of the term "antiseptics," or to attempt to differentiate between "antiseptics" and "disinfectants." The words have now for all practical purposes become interchangeable, and in this sense will be used in anything further I may have to say. Neither do I intend to tell you what you already know with regard to the important part played by micro-organisms in putrefactive changes, or enumerate the host of agents at our command to combat these, marshalling them before you according to their respective germicidal powers. My further object is much more simple, and yet may not fail to be of some little practical importance.

The commonest operation which we have to perform is the preparation of cavities for the insertion of fillings, and beyond the mechanical details and immediate surgical considerations presented, we have always to contend with a septic condition of tissue. In simple cases where we can cut well beyond the infected area, the condition gives no trouble; but how often does this become difficult if not impossible? In these difficult cavities disinfectants must be of value. One of the essential conditions of putrefactive change in any material is the presence of water, and, no matter how favourable the other conditions may be, absolute dryness will protect the most susceptible bodies from putrefaction for an indefinite period *and even arrest the process when already begun.* Heat is undoubtedly the best disinfectant we possess; and although a very high temperature is of course inadmissible in the mouth, yet failing to use it in its full therapeutic power we can still utilise it in producing a condition of dryness which is not without its proper value. I believe that the consistent use of the hot-air syringe is one of the operative reforms which is most to be desired. The air itself may be rendered

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more pleasant and at least *aseptic* by dropping into the rubber bulb of the syringe a few drops of eugenol or eucalyptus oil; or this can be accomplished more satisfactorily by having a special disinfection chamber constructed in the base of the nozzle which can be easily charged from time to time. As a further precaution any unsound dentine, left in the immediate neighbourhood of the pulp for instance, having been thoroughly dried, should be painted with an antiseptic varnish and then finally dried with a current of warm air. For this purpose I have used for a long time a particularly good varnish made of saturated solution of iodol in absolute alcohol one part, Hubbard's negative varnish four parts. The only objection to it is its liability to discolouration after being kept for a time, and for this reason beta naphthol may be substituted for the iodol with advantage. The use of an antiseptic varnish of this description is especially indicated in those cases of soft rapid caries of children's teeth where, for obvious reasons, excavation must often be far from thorough.

Next to the common necessity for the disinfection of cavities comes the vexed question of treating the varied and complex septic conditions which arise in connection with so-called dead teeth. Let no one shudder and suppose that I am going to weary you with a long dissertation on dead teeth. My only object in mentioning the matter is to discuss very briefly the principle which governs ordinary treatment, and to enquire whether this be rational and wise. I was taught when a student to fill all nerve canals in connection with teeth found to be dead with wet carbolic acid, or other antiseptic dressings, and complete the operation with a good tight plug of mastic on wool. This was to be persevered in until the dressings ceased to smell disagreeably, when a fresh relay of carbolic dressings were inserted and left *permanently* under any filling which was then put in. We did not know exactly what the magic of our treatment was, but we felt that *the tooth* had been treated antiseptically, and that we must be doing the *right thing*. I venture to assert that this is the treatment carried out by the bulk of dental surgeons to-day, and not only practised but taught to the present race of dental students. Is it rational and sound? I think not. Let us take a typical case. We have to deal with a more or less limited area of inflamed tissue, which has broken down around the apex of the root of an affected tooth, and for want of other vent, the discharge finds exit by the pulp canal. The treatment indicated is scarcely to

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dam up the discharge with wet dressings, whether antiseptic or not. We shall surely assist nature rather by mopping up the discharge, and doing this under the best antiseptic conditions possible. This is the principle of treatment which I have adopted for some considerable time, and which I venture to submit is sound in theory and valuable in practice. Having dried out the canals as thoroughly as possible, I put in dressings of antiseptic paper wound round a smooth Donaldson bristle, previously oiled and wiped, filling up a portion of the pulp chamber, if deep, with a loose plug of paper and sealing with antiseptic wax. For filling in the tooth cavity, I prefer gutta percha containing ten per cent. of iodol. I consider the tooth is now placed under the most favourable antiseptic conditions, and the dressing may, of course, be changed at the discretion of the operator. I quite admit the difficulty of carrying out the treatment in all cases, and deplore, in common with my brethren, cases of failure from time to time; but on the whole, and compared with former methods, I consider the results good. The paper can be made by saturating Japanese bibulous paper in a ten per cent. etheral solution of iodol or iodoform, and allowing it to evaporate thoroughly. It can also be coloured with turmeric to show the amount of discharge by the alkaline reaction of the pus, the only objection being the liability of discolouration of the fingers in manipulation. The wax referred to, which is also a capital permanent fang filling applied on paper, is made from a formula which I published last year, and is composed of:—

Paraffin	ʒiij
Spermaceti	
Yellow wax, āā	ʒij
Iodol...	ʒj
Carmine	gr.j

The dressings can be obtained from the Dental Manufacturing Co.

There is one other point which I wish to consider, and that is the question of how far the antiseptic qualities of a filling may influence the well-being of a tooth—more especially if it be dead or very extensively carious. Where a gold or osteo filling has been inserted in a properly excavated and thoroughly dry cavity, provided the plug is mechanically sound, all goes on well. But when we come to amalgams the case is altogether different, for it becomes next to impossible to make a water-tight plug. I

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believe that the reason why so many teeth are saved by amalgams is due rather to the chemical reaction between the dentine and the metals employed, than to any mechanical excellence of the plug which is too often only conspicuous by its absence. We are all familiar with the antiseptic properties of copper salts, and with the fact that all amalgams which are essentially tooth-saving, contain copper in a greater or lesser degree. This is especially true of Sullivan's amalgam. The lesson which we may learn from these familiar facts is, that whilst we strive to excel in putting in fillings which shall become more and more mechanically perfect we should not forget that the arrest of caries will be promoted by certain auxiliary methods which ought not to be neglected.

I have already referred to the use of hot air and antiseptic varnish; there yet remains the question whether it be worth while to render our temporary fillings antiseptic. For my own part I consider this highly advisable, especially in the treatment of dead teeth. For some time past I have added ten per cent. of iodol to gutta percha and osteo fillings with much advantage, as I think. The drug is neither unpleasant nor injurious in the mouth; and, although the gutta percha is perhaps made a trifle perishable, I am inclined to believe from a long series of experiments in the mouth, that oxy-phosyhates treated in this way do their work well. I have only mentioned iodol so often, not because I am prejudiced in its favour as against all other antiseptics, but for the reason that I believe it to fulfil several special requirements for the mouth, amongst which one is bound to recognise its germicidal, non-injurious, tasteless, and sedative properties.

The PRESIDENT: We have had a very clear statement of Mr. Williams's views of a subject in which we have a very decided interest, and I hope it will lead to a very useful and satisfactory discussion. We shall be very much pleased to hear the views of any gentlemen.

Mr. A. KIRBY: I am not prepared to enter into a discussion upon the interesting paper, but one point I must take exception to. Mr. Williams said it was not possible to make an air or water-tight stopping. I think that wants very great qualification. There is nothing to prevent an air-tight stopping, and if you use an amalgam, mixed in two separate portions, the first soft and the

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second tolerably dry, you will find it is perfectly water-tight. The fact can be demonstrated with a bar of amalgam an inch long; you cannot detect a change in a bar of that length, and if you cannot you are not likely to do so in one $\frac{3}{16}$ of an inch in diameter.

Mr. George Brunton: Might I ask Mr. Williams why he mixes the antiseptics through the body of the filling? Is it not sufficient to line the tooth with it and then fill in?

Mr. Coffin (London): I should like to ask Mr. Williams if he has satisfied himself by alternative experiments, that the addition of an antiseptic of resinous varnish is any advantage?

Mr. Charles S. Tomes: One point occurs to me about what Mr. Lloyd Williams has said, and that is as to the advisability of using wax that has been rendered septic. I have used wax, as filling, very largely, using it alone, and running the wax down the roots. I have used it also in conjunction with little tiny slips of wood, and in connection with wool and paper, but I rather come to the conclusion that wax is an unreliable material,—for one thing, it disappears. Fill the root with wax or paraffin, or with mixture of paraffin and wax, and seal it up with an osteo or gutta-percha filling, or an amalgam filling, and if you seal it with a temporary filling and open it up you will find that the wax is all gone. It seems to have soaked into the dead tooth, or something or other has happened to it, and you frequently find the tooth in a satisfactory condition as regards absence of any smell of decomposition; the root, which was filled has become empty, and sometimes the cavity so left has become filled with offensive material. I doubt whether wax is a good material to use in the root, and when I use wax now, I commonly use it with ordinary binding wire, running in some wax with a hot instrument and just as much wire as will go in, but I do not like wax with an absorbing material like paper or wool. I forget at the moment by whom it has been used, but I certainly have met with the statement, that wax used in ordinary surgery is a material which becomes very aseptic, and causes a nasty porous, stinking matter. I think Mr. Williams's suggestion that we ought to use a porous dressing in the early preparation of a suppurating tooth, is a very valuable one.

Mr. R. F. H. King: With regard to the question as to the antiseptics that should be used, Mr. Lloyd Williams has told us very clearly that the best is dryness. Where a cavity is perfectly dry, there, it seems to me, that no antiseptics are required, if you

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are going to hermetically seal up that cavity. I have tried some experiments in that matter myself, and I find nothing so good as a thin solution of gutta-percha in chloroform. Stopping up a cavity you have to use it thicker to allow the chloroform to evaporate, but you must first have your cavity dry, and then not only the nerve canal filled up, but all the inter-spaces saturated with the gutta-percha, and I get the thin solution of the gutta-percha dissolved with chloroform and some aniline ink in it, and I put the solution into the nerve canal. The next day I get a section of it and grind it with a piece of cork on the stone, and then I put it under the microscope, and I find the gutta-percha has penetrated into the tooth a considerable distance. As to the amalgam stoppings it is a very great question whether any stopping whatever is water-tight. It is difficult to tell, but whether they are or not I think is an open question, because if you put any stopping under a severe test of ink, you will find that the ink has penetrated somewhere, if ever so little. On one occasion I extracted a tooth from a man who smoked a great deal; on cutting the tooth in halves I could trace the tobacco ramifying into it and meeting on each side, so the stopping was not water-tight.

Dr. Stack: The points that strike me in this paper are the treatment of the amalgams in the mouth, and the treatment of the roots of the teeth. I shall limit my remarks to the roots of the six front teeth, in the treatment of which there is no great difficulty if there is any life in them. If the death of the tooth is complete, and if putrefaction has set in, the whole condition is changed, and you come to deal with a tissue that is practically inaccessible to the mechanical interference of your instruments. Your treatment then becomes a treatment more or less by drugs; and I believe the proper course in these six front teeth is to clear them out thoroughly, and fill them to the end, and if an abscess is going to happen in the neighbourhood, let it happen, and try to promote it, and treat it through the gum. Of course there is a certain contingency that the abscess may point in an awkward direction, but the chance is certainly a small one, and the certainty of your treatment if you succeed in filling the root, fully producing the abscess, and treating it through the gum, is such that I have adopted it for the last six years. As regards the cleansing of the roots, the treatment I adopt is this; supposing I have presented to me a root in the front of the mouth, in which there is a large amount of decomposition, my first treatment is to open

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it freely towards the mouth, and wash everything away with a little water, and then having the thing clean, I leave it open. Having done that for two visits, I take a piece of gutta-percha and chloroform, and push it into the apex of the root. When I hope I have got it there, I place, at the orifice of that root, towards the mouth, the nozzle of the hot-air syringe. The rationale of that is this:—the moment you heat all the air of the tubes of that tooth, and push a little of the antiseptic fluid in, it is soaked up as the air cools, into every dentinal tube in it. After doing that once or twice I fill the root with a solution of creosote and chloroform. Next day patient may come with an abscess at the end of that root, but I promote that abscess and see if it can be brought through the gum, and know that the cure will be complete.

Mr. STIRLING: Mr. Williams said he plugged the tooth charged with 60 per cent. of eugenol and iodol, but if it is evaporated what is the use of the iodol in the tooth. I think we require no iodol on the plug at all. I don't think there is any use in putting in cotton-wool. If, after having cleaned the tooth with potash or soda, we force pure carbolic acid up, we require no cotton-wool. I have had very great satisfaction in working in that way. With regard to the amalgam stoppings being water-tight, I have seen two or three cases where the amalgam stoppings were water tight, but it depends upon how they have been put in.

Mr. COFFIN: I should like to refer to one point--the hot-air syringe. I had one with a little arrangement whereby the air passed through or over cotton-wool, which I used to saturate with an antiseptic to make the air agreeable, and I used oil of cloves with this result, that some non-volatile portion of the oil was carried over, or that the walls of the cavity afterwards were not so dry and adhesive with the adhesive fillings as when hot-air was used alone, and I think that is a point that should be borne in mind. Possibly a perfectly volatile antiseptic may be used, or eucalyptus oil. I mention this as a matter of caution, and I should think that the best way of treating the air, which evidently ought to be treated in some way, would be to heat it very strongly only before using it.

Mr. KLUHT (London): I consider that we ought, under all circumstances, to be capable of avoiding the state of things which Dr. Stack seems to think can easily be got over. I think there is nothing more trying to a man than to feel that, in all probability, his patient will have to go through the suffering, and sometimes

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the serious consequences of an alveolar abscess. I would like to accentuate one point, the great necessity of having perfect dryness, for I think where so many have failed in the past has been in using antiseptics freely, and introducing moisture. I find in the first visit nothing is necessary but absorbing all moisture and all impure substances at the roots, and after that visit the other treatment is pretty straightforward, and I think an abscess need not occur in most cases.

Mr. KIRBY: I think the matter of the exclusion of moisture is a very important point. Readers of Professor D. Tyndall's book on Dust and Disease will recognize how very difficult it is to produce germination in a dry place. The subject of a more powerful antiseptic has been alluded to by Dr. Stack, and he has used bi-chloride of mercury. I have not used it, but I have used arsenic, in the manner advised by Mr. Coleman, and no pus has formed. It is a doubtful question whether eucalyptus is an antiseptic at all, and my own opinion is that carbolic acid is very much more powerful than is supposed to be the case. With antiseptics of the kind of bi-chloride of mercury, we may rely on the destruction of germs that might be formed in the tooth.

The PRESIDENT: Before calling upon Mr. Lloyd Williams to answer the questions, I should like to make a remark upon this subject, as I had a special interest in one little item in the paper, which has been taken notice of by one or two of the speakers, the possibility of making water-tight plugs. Mr. Williams wants us to give our attention to principles. I think it is a case in which we must have a tolerably clear understanding in respect to details before we can arrive at anything like certainty in respect to what we call principles. It is on record that various forms of amalgams can be filled into a cavity so as not only to be made water-tight but perfectly air-tight, under a pressure of two feet of water, which is one pound. Perhaps we have some members of the Odonto-chirurgical Society here who were present when this was demonstrated two or three years ago. I quite agree with Mr. King, who raised the question,—whether the tooth itself were water-tight? I have no hesitation in saying it is not. Water permeates through the whole substance of the tooth. We have evidence of that constantly in the application of the rubber-dam. A tooth which has been kept dry becomes a different colour, and if you put it into water you bring it back to the mouth colour, and suppose we get the cavity perfectly dry, I quite believe that unless

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we fill it absolutely it will not so remain, because of this passage of fluid. Mr. Kirby called our attention to fillings being water-tight, and he stated that in my paper I said it was impossible to form water-tight amalgam fillings. What I said was that it was extremely difficult and almost impossible, and if Mr. Kirby will try a few experiments, soaking his amalgams manipulated in the ordinary way, in such a fluid as Draper's ink, he will, I think, be a little disappointed in the results.

Mr. KIRBY: I have done it all, and with a severe test under pressure of 7lbs. to the square inch.

Mr. WILLIAMS: I have been unfortunate in my experiments. Mr. Charles Tomes will bear me out in saying that in his own experiments the flask in which a full amalgam filling was put by the ordinary manipulation was unsuccessful if tested by such a fluid as Draper's ink. He found that the Bonfield method of putting in amalgams was the only one which gave perfect results. My object to-day was not to call attention to amalgam fillings or to the different manipulative methods of working them, but of one thing I am certain, that 99 out of every 100 amalgam fillings which are put into the mouth by the bulk of practitioners let water in freely and are not water-tight. Mr. Brunton wants to know whether there is any advantage in inserting any antiseptic into the body of the filling after the tooth cavity has been treated antiseptically, and I only say that, with regard to my own experience, I find that it is of absolute use, especially in dead teeth. I believe such a thing as a tooth which is soaked with septic matter cannot be rendered perfectly antiseptic at one visit. Where you have a dead tooth to treat, it must certainly be of advantage to have in the body of your filling an antiseptic which is practically at work the whole time. Mr. Tomes referred to wax as being an unreliable filling. I think there is some truth in what he says, although I cannot believe that wax, if sealed in thoroughly, can be altogether unreliable. I have taken dressings out which had been in some time, and they appeared to me to compare very favourably with others. With regard to dry dressings, I am glad to refer to them. I should have been glad to hear how many do try them, and I should be pleased if you would try some of the specimens of paper handed round. We have had a variety of directions with regard to fang fillings. Mr. King referred to gutta-percha and chloroform. My great objection to a filling of that sort is that gutta-percha is one of the most absorbent materials, and, in con-

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nection with roots, one of the worst. Dr. Stack has described a very heroic treatment of abscess. This heroic treatment has been adopted by some of us from necessity where we have filled up the root thinking it was healthy, whereas it was not, and the result has been rather disastrous. The abscess has not appeared in two or three days, but in some weeks, and the tooth has had to be extracted owing to the extreme misery of the patient and his refusal to have anything but extraction. The line of discussion which Dr. Stack has also taken is that in connection with alveolar lesions the treatment is rather to disinfect the tooth than to treat the soft tissues there. My object is to treat the soft tissues which are beyond our reach, by assisting nature by absorbing under antiseptic conditions. With regard to the remarks of our President, of the passage of fluids through the tooth, I must confess my ignorance, for I have never made any experiments on the point.

On the Application of Electricity to Dental Uses.

By A. KIRBY, L.D.S.Eng.

Mr. President,—In venturing to read before this Association a paper connected with such a highly-developed science as that of electricity, I am fully aware that I may be addressing some gentlemen whose knowledge of it is far greater than any I can pretend to possess; I must, therefore, ask their forbearance whilst I treat the matter in a somewhat practical manner, and with the use of as few technical terms and descriptions as the subject will allow.

At a period when some of us could hardly be called young in practice, our instruments were of a primitive, if not unsuitable kind, and it was even more difficult then than it is now, to obtain the carrying out of anything departing from the usually accepted forms. The need of something further was, however, strongly felt and many efforts were made to produce rotating mechanical

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motion in various ways; more than one of these being to my own knowledge in the direction of treadle engines. It was in America, however, where new ideas are more readily accepted, that the first engine of the kind was offered for sale. My own attention was directed to the subject at an early date, and after some more or less successful efforts, a burring engine was made of unique form which I still continue to use. Invaluable as is the help of these engines, we are most of us aware that their use is attended with some discomfort, when the body has for any length of time to be balanced mainly upon one foot, whilst the other is engaged in operating the treadle. Hence, from the earliest days some operators employed water or other motors to propel their engines. It is not however, always convenient (even if a supply is at hand) to bring water into our operating rooms and the difficulty is rather greater in the case of other motors. The recent progress of electrical engineering has however presented to us several forms of electro-motors which have many points to recommend them; one being that power can be conveyed to them from a distance by small wires, but they all stop short of the perfection we should like to attain.

The speed of our ideal engine should, if possible, be under our control; as our fastest burr-points travel at an incredibly slow rate. An average-sized burr or Herbst's burnisher makes at a usual rate of working, a progress of about one mile in three-and-a-half *hours;* or in other words, moves about as fast as the pendulum of an old-fashioned kitchen clock.

It is also of the first importance that our engine should start and stop almost by our will and without help of either finger, hand or foot; except such movement as is usually necessary to control or direct our instrument; if otherwise, we might almost as well have to use our foot for the treadling during the whole process. I have for some time been trying to obtain or produce such a motor, and shall perhaps best explain the means which have been taken towards accomplishing these ends, by giving a general description of the apparatus I have contrived and have in use, trusting to a view of the thing itself for its more complete comprehension.

Description of Motor.

A heavy-footed stand is provided with an upright tube; into the tube is fitted a metal rod which rotates, but not too freely.

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To the upper end of the rod the motor is attached by a joint resembling the rising hinges which are sometimes put upon doors, to make them close by their own weight. The motor occupies a horizontal position, and its axis is prolonged into an arm or a flexible cable, to which is fixed the usual hand-piece; when not in use, the whole of this part moves quietly out of the way by the help of the rising hinge or joint. The motor itself may be constructed on any of the well-known principles. The one I have in use is of the old Jacobi type, which is very convenient, if not the most powerful. One of the terminals of its wrapping is in electric contact with the frame or body, and consequently with the whole of the stand. The other terminal is insulated, and is connected to one of the leads from the battery; the second lead from the battery terminates in a pin which is stuck into a hole in the upright rod, from which it is, however, carefully insulated. The hinge on which the motor hangs, has been described as being in electrical contact with one end of the motor wrapping; it is also provided with a vertical spring or tongue of metal, which reaches as far down as the insulated pin of the battery lead (also described), but when the motor is out of use it does not touch it. As soon, however, as the hand-piece is made to approach near to the point on which it is desired to operate, this pin and the spring are by that action brought into contact, and the motor begins to work, and continues to do so until the instrument is removed away from the tooth. The action of the motor can be stopped by the foot at any time, but except in case of an accident this is never necessary.

In order to regulate the speed of the motor, governors are employed, suggested by those of the steam engine, from which, however, they differ entirely in detail; they act by intercepting the current when the speed becomes too great, and can be regulated at will to work at any required speed.

When arranged in this manner, the motor starts and stops automatically at the exact point we desire and revolves at the pace we consider most suitable. Of course the details may be varied very considerably. Thus, the engine may work through the medium of a cord like an ordinary burring engine; the only advantage of which would be that the instrument is capable of slipping when much resistance is offered, which I am informed is by some operators considered desirable.

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Mallets.

Another purpose for which electricity has been usefully employed, is in giving motion to mallets, for introducing and welding adhesive gold in tooth cavities; the advantage being that a quick effective blow is delivered at a high velocity, without the aid of an assistant or the employment of a finger or a foot in obtaining the same. The blow given is far less injurious to the surrounding parts than that from a heavy hand mallet and far more effective than that from a spring, although it is not better than the blow given by a light hand-mallet, or by some others; such as my automatic pluggers, or by mallets on the pneumatic principle which I introduced some years ago, and which re-appear in various modified forms and under different names. In examining the electric mallets already introduced, one is at once impressed with the wish that they could be made lighter, and that the weight could be in a line with the instrument, so that they could be used in any position. With this view certain modifications were attempted. First, the form of magnet and its electrical proportions were altered,—next the spring "make and brake" was replaced by one which allows the keeper to rise to its full extent before contact is re-established; thus doing away with the necessity for a strong spring upon the keeper; then the finger contact maker was altered; the connexion to the battery leads was improved and made in the form of a universal joint, which does away with the risk of breakage; and finally, as a consequence of some of these alterations, a fixed instrument-holder was introduced, with a spring socket, which, whilst it retains the points firmly for use, allows them to be removed by the aid of the thumb and finger only. By these means (as well as being perfectly balanced) the weight of the instrument is reduced from something over six ozs. to the more manageable amount of something over two ozs.

Whilst engaged in carrying out these modifications, the idea occurred that it would be convenient to have a mallet which should be set in action by very slight pressure upon the point of the instrument and one was made, which continues to hammer only as long as the point is pressed or rather touched upon the gold. It is in action something like a "Snow and Lewis," but gives a number of blows with the slightest pressure. It is in many ways a very convenient instrument.

It has further always appeared to me to be very desirable that

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we should be able in using a mallet to deliver an effective blow from behind forwards; so for instance, as to introduce a stopping firmly towards the anterior wall of a crown cavity in a lower molar, or into the distal cavity of a bicuspid or molar; for however we may try to make ourselves believe it, no amount of curve in a point, will change the direction of the force it carries from that of a *straight* line into *any other* line.

After making some experiments, I found that by causing the striker to impinge obliquely upon a short point, the direction of the force is changed in the same way that occurs when one billiard ball is made to strike obliquely upon another. By proceeding upon this principle, an instrument may be made which delivers its blow obliquely, or as it were round the corner: and I have with me an electric mallet in which blows of this kind are given whenever pressure is made upon its point.

Lighting.

The subject of electric lighting is one on which it is not necessary for me to say more than that we have the means for employing it as soon as we have obtained the current for our motors and our mallets.

Batteries.

Having very imperfectly described the instruments to be used, I must now endeavour as briefly as may be to say something of the ways in which we may obtain a supply of electric current to set them in motion. In spite of the difficulties and inconveniences attending their use, I believe that dentists who employ electricity generally obtain their supply from primary batteries, although no suitable battery of this kind is yet introduced or offered for sale, which produces anything approaching to a constant current. For working a motor this is not of so much consequence, since the governors make up entirely for its irregularity; with the exception of the Laclanché all useable batteries require to have their plates removed from the acid when they are out of use. Almost all, too, require the use of a large bulk of caustic and dangerous acids, which is highly objectionable. For the mallet, however, no primary battery yet used is in any way satisfactory, their power falls off so rapidly, that although they may be too strong when first charged, they soon become too weak for effective action. This is evident enough to all users, but is made more striking

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if their working is tested from time to time by means of an ordinary galvanometer.

After these remarks, in which I am confirmed by Sprague and all other authorities, very little more need be said on the subject; but it may be mentioned that the Grove, the Bunsen, and the bichromate are perhaps the best of the ordinary batteries. I have tried the Schanschieff, which promised well, but its plates cannot be left in the solution for more than the shortest time without serious loss; also the copper oxide battery which is too bulky, and has a very low E.M.F. I have also experimented to a limited extent with the Upward chlorine battery, which is the only departure from previously well-known forms, but unfortunately it yields a comparatively small current, although the E.M.F. is unusually high. The primary battery I have used most, is a modified Laclanché on a large scale; and if made so as to be easily charged, it has considerable merits, and does not require the removal of the plates from the solution.

As before stated, none of these batteries (except perhaps the Upward chlorine), are suitable for use with the electric mallet, which must have a constant current if it is to work in the smallest degree satisfactorily; we must therefore supply it by some other means, such as a storage battery, or some modification not yet in general use.

If a primary battery *must* be employed for working the mallet, it is best to intercept some of the current with a resistance coil when freshly charged, and to remove the coil after a short time.

Before proceeding to discuss the other sources of electric power, it is perhaps advisable to give some attention to the storage, or secondary battery, which does not *produce* electricity, but in a manner stores it up for use in a most convenient form, when it has been produced in an inconvenient one. By its aid tramcars and steamboats are propelled, and electric lighting is carried on whilst the generator is at rest. It can be charged from any suitable source of electricity, such as a dynamo or a primary battery, and can be taken away to be charged if convenient: this battery gives out its power exactly as we require it in a constant and equal current (which we can exactly proportion to our need), at an uniform pressure of two volts for each cell and it possesses the further advantage that it does not waste power by causing the heating of wires, as is the case in primary batteries with unsuitable-sized plates.

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A battery of this kind will be used here for demonstration, and I am very glad to take the opportunity to mention that it has been very kindly lent for the occasion by Messrs. Muir, Mavor and Co., of Glasgow, to whom I feel myself very much indebted for the loan of the battery, as well as for its charge of electricity.

The other sources from which current can be advantageously obtained are, first, the dynamo, which is by far the most important and generally employed of any, furnishing as it does practically the whole of the electric current which is used for lighting, electromotors, and all other uses except those on the smallest scale, for which the Leclanché is generally used.

A small dynamo may be used for dental purposes by attaching it to a water motor, as has already been done at my suggestion; or it may be driven by any other convenient motive power, and the current may be taken directly from it for our use in the surgery or it may be stored in a secondary battery. For supplying current for a mallet the storage battery is admirably adapted and specially fitted; it may be charged with a dynamo operated by a crank handle or by a treadle, as no great quantity is required for the purposes.

The last source of electricity which need be mentioned, as possibly being an important one to us, is the thermopile, which converts heat directly into electricity. Many varieties of apparatus have been tried for this purpose without much success. Noe's pile is in use in Germany for laboratory purposes, and is employed to produce electric light for examining cavities in the body, by Dr. Oliver, but its power is comparatively small.

Although a thermopile of French manufacture has also been included in the scientific instrument makers' lists, for some years it was difficult to obtain any reliable information about it. Recently, however, this has been materially improved and made for sale by M. Chaudron, of Paris, who states that it retains its power perfectly, after years of use, if it is not overheated in attempting to make it work past its proper limit. By the courtesy of Mr. Berly, of Herne Hill, I am able to exhibit an apparatus of this kind, which has been very generously lent for the occasion, and sent over specially for the purpose by M. Chaudron. It was set to work immediately on its arrival at my house, and in a few minutes the galvanometer showed that it was producing 1 ampere of current at an E.M.F. of 1 volt, which increased until first the mallet, then the motor, and finally both together were put in action,

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a result which was certainly more than could possibly have been anticipated from its appearance, and was, of course, altogether most highly satisfactory. When once properly heated the current may be taken off at pleasure, and when not required may be employed to charge an ordinary storage battery, so that it need not be wasted.

There is one point in connection with the supply and use of an electrical current which is very important to bear in mind, namely, that the wires used in making our motors and mallets must always be proportioned to the battery or source from which we obtain our current. A motor which is wrapped so as to work well with a certain current, will fail altogether if supplied with current of unsuitable quantity or intensity. Therefore, in obtaining electric machinery we must be careful that the motor or using part is properly proportioned in relation to the battery or supplying apparatus.

The CHAIRMAN: I am afraid that we shall experience some of the difficulty we experienced yesterday, when we had not the opportunity of seeing the appliances to which Mr. Kirby has referred, but as there may be some points that may be discussed in the absence of the instrument, we shall be glad to hear any gentleman who wishes to take part in the discussion.

Mr. COFFIN: It is not easy to discuss instruments which one has not had the advantage of seeing, but so far as I can gather from the paper, I am very pleased to hear that Mr. Kirby is incorporating in a form of plugging instrument, what I am surprised the manufacturers hitherto have not considered. I do not know when the first electrical mallet was made, but at our section of the Congress in London I showed one that I made myself, in 1869, that, so far as I can ascertain, embodies the points that Mr. Kirby is also bringing out. The instrument was mechanically stopped, and by the adjustment of cords its axes could be revolved in every direction, and the blow was rather long, with an imitation of the hand-mallet—more than the present rapid smart blow. I attempted to reduce the weight by having the wire made of aluminium instead of copper, the conductivity of which is about the same. I also introduced a point contact to produce contact, but I abandoned that, because I found it was not so desirable to keep the point always on the cold silver, and better to have other forms of contact. It was regulated by clockwork. I mention all this not to claim priority, but simply to say

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that I do not use any form of electrical mallet. I hope that Mr. Kirby's paper may overcome some of the objections, and I think some regularity of blow more than is contained in the automatic make and break instruments must be devised on some simple method of regulating the intensity of the blow. I found my automatic make and break the most satisfactory way of getting the blow. As the blows were slower they were more powerful. This was made for me afterwards, in an improved form by Messrs. Elliot, the electricians. The first one they charged me £75 for; it was made of aluminium and vulcanite, and was a piece of very useful work. In regard to an electrical engine, I think it is a misnomer to speak of an electrical engine when it is worked merely by electricity. I do not know when Dr. Green first made his engine, but about a couple of years after I made the mallet I first made an electrical engine, and that also could be revolved on its own axis, and it was comparatively light; but I came to the conclusion that it would not do, simply because the peculiar gyro action of it by the hand made it impossible to control the angular motion of it at high velocities. I am glad to hear that Mr. Kirby has had a satisfactory experience with this little thermopile. I have been promised one from Germany, it is a thermopile with an accumulator, which I am informed is very cheap, and in cold weather it will warm a small room, and working at one quarter of its range, will charge an accumulator in six hours, from which you can draw an hour or an hour and a half's work.

Mr. King proposed the adjournment of the debate to the Dental Hospital, where the instrument could be seen.

Mr. Smith Turner proposed that they should hear Mr. Cunningham's paper before they left the room. This was seconded by Mr. King, and, after some discussion, agreed to.

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On the Dental Aspect of Public Health.

By DR. G. CUNNINGHAM, L.D.S.Eng., B.A.Cantab.

Mr. President and Gentlemen,—Is there a dental aspect of public health? Most emphatically, yes. Mr. Fisher's paper on "the Compulsory Attention to the Teeth of School Children," may be said to have called it into existence at the Cambridge meeting of our Association, a paper which was ably followed up by his communication of last year on the same subject.

The paper "On Dentistry and its Relation to the State," which I had the privilege of laying before you at our last meeting, presented another view of this great question, which I trust has done something to promote its advancement. It would be premature to measure that advancement in any way at present, as the resolution that these papers should be published and distributed in the most likely quarters at the expense of this Association, has not yet had time to bear fruit, owing to the sad and unavoidable delay in the production of the preface through the long and regrettable illness of Sir John Tomes. The action of this Association, the approval and commendation of the excellent editor and Publishing Committee of the Association Journal, and still more the consent of our esteemed and revered leader to write a preface, constitute a recognition of the importance of the question as brought before you by Mr. Fisher and myself. That recognition by the dental profession, however important, however powerful and however complete, is at best but unsatisfactory. True, it is the first and essential step to success, but that success will only be complete when the justice of our claims and contentions in this matter are as equally well recognised by the medical profession, the press, the public and the state.

The efficient treatment of so great a question must no longer be left in the hands of a few, no matter how energetic they may be, and the object of the present paper is to suggest some plan of campaign which may, after due discussion and approval, receive the weight and influence with which the corporate and united action of this Association can imbue it.

In order to advance this question, we must first consider how far our views fit in with the already recognised schemes of hygiene and sanitary science; I shall, therefore, as far as possible, quote

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the actual utterances of some of the greatest authorities on the subject.

The first sentence in the late Professor Parke's work on practical hygiene, is characterized by a masterly conciseness, "Hygiene," he observes, "is the art of preserving health; that is, of obtaining the most perfect action of body and mind during as long a period as is consistent with the laws of life. In other words, it aims at rendering growth more perfect, decay less rapid, life more vigorous, death more remote."

Dr. Wilson, in the introductory chapter of his excellent manual, discusses public health and preventable disease; public hygiene he defines, "as that branch of sanitary science which concerns the physical condition of communities. It embraces a consideration of the various influences operating upon society, whether for its material good or its actual deterioration, with the view of extending the former and preventing or ameliorating, as far as possible, the effects of the latter. It involves the enactment of laws by which the safety of the whole may be protected against the errors of a part, and, above all, it aims at the prevention of disease by the removal of its avoidable causes. In a wide sense, therefore, the science of public hygiene enlists the services of the people themselves in continual efforts at self-improvement; of the teachers of the people, to inculcate the best rules of life and action; of physicians in preventing as well as curing disease; and of lawgivers, to legalize and enforce measures of self-preservation. But while it is the special province of the medical profession, as guardians of the public health, to study the causes of physical deterioration and disease, and to point out how far these causes may be controlled or averted, the general well-being of the people must mainly depend on their own exertions and self-restraint. Sanitary improvements in man's material surroundings, will not compensate for social transgressions against laws of morality, for public virtue is essential to public health, and both to national prosperity."

Accepting either definition, is it not at once evident that the achievements of modern dental surgery should constitute an important factor in the maintenance of public health, and that any scheme of public hygiene, which disregards the function of the dental practitioner in the prevention as well as in the cure of disease, is to that extent at least incomplete.

A little further on in Dr. Wilson's manual, we read that the

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vast amount of preventable disease with which sanitary science and sanitary legislation had to combat at the date of the passing of the Public Health Act in 1872 is evident from the report of Sir John Simon. He then estimated "That the deaths which occur in this country are fully a third more numerous than they would be if our existing knowledge of the chief causes of disease were reasonably well applied throughout the country, that of deaths, which in this sense may be called preventable, the average yearly number in England and Wales is about 120,000, and that of the 120,000 cases of preventable suffering, which thus in every year attain their final place in the death register, each unit represents a larger or smaller group of other cases in which preventable disease, not ending in death, though often of far-reaching ill effects on life, has been suffered. And while these vast quantities of needless animal suffering, if regarded merely as such, would be matter for indignant human protest, it further has to be remembered, as of legislative concern, that the physical strength of a people is an essential and main factor of national prosperity; that disease, so far as it affects the workers of the population, is in direct antagonism to industry; and that disease which affects the growing and reproductive parts of a population, must also in part be regarded as tending to deterioration of the race. Then there is the fact that this terrible continuing tax on human life and welfare falls with immense over-proportion upon the most helpless classes of the community; upon the poor, the ignorant, the subordinate, the immature; upon classes which, in great part through want of knowledge, and in great part because of their dependent position, cannot effectually remonstrate for themselves against the miseries thus brought upon them, and have in this circumstance the strongest of all claims on a legislature which can justly measure, and can abate, their sufferings."

Everyone recognises the fact that the diseases with which the dental practitioner deals do not directly contribute to the death-rate, and that they are neither infectious nor contagious. Hence, doubtless, arises the utter indifference of the community with regard to them, nor will that indifference be removed until the contributory and indirect influence which they have on the death-rate is better understood. It has been pointed out in a recent address by the President of the Southern Counties Branch of this Association, that within 50 years the mean duration of life has advanced from 30 to 38 years. He ascribes this in a great

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measure as being due to sanitary progress, and describes it truly as a grand result. He believed that some part of that improvement in the general health and longevity was due to the exertions of the dental profession, because we knew that digestion could not go on without good teeth. Such remarks from one who is not only a distinguished member of our profession, but who, as an individual, and in his aldermanic capacity, has done much to promote sanitary measures, merit careful consideration by the public.

It will be easier, however, to obtain a recognition of the fact that the pain and misery arising from dental diseases form an enormous part of that needless animal suffering, which, Sir John Simon describes, as calling for indignant human protest, and as being of legislative concern.

In the inaugural address by Sir John Simon, as President of the Section of State medicine in the International Medical Congress of 1881, we find the following remarks, which seem pertinent to our contention that State dentistry should be included as a necessary part of the larger subject of State medicine.

First: "A few words on what may be called the general theory of our subject matter. The term 'State medicine' corresponds to the supposition that, in certain cases, the body-politic will concern itself with the health interests of the people—will act, or command, or deliberate, or inquire, with a view to the cure or the prevention of disease. Before any such supposition can be effectively realised, the science of medicine—that is to say, the exact knowledge of means by which disease may be prevented or cured—must have reached a certain stage of development; and, unless the science be supposed common to all persons in the State, the existence of State medicine supposes a special class of persons whom the unskilled general public can identify as presumably possessing the required knowledge. Thus, given the class of experts to supply the required exact knowledge, the body-politic undertakes that, within the limits of its own constitutional analogies, it will make the knowledge useful to the community.

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"And in the interests of health, the State has not only, as above, limited the freedom of persons and property in certain common respects, it has also intervened in many special relations It has interfered between parent and child, not only in imposing limitation on industrial uses of children, but also to the extent of requiring that children shall not be left unvaccinated.

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"It shows beyond question that the legislature regards the health of the people as an interest not less national than personal, and has intended to guard it with all practicable securities against trespasses, casualties, neglects and frauds."--(Eleventh Report of the Medical Officer of the Privy Council, 1869, pp. 20, 21.)

Briefly applying these remarks to our own speciality, dental science has surely reached the necessary stage of development, and as the class of experts to supply the required exact knowledge exists in the Dentists' Register of the General Medical Council, the body-politic should therefore undertake to make their special knowledge useful to the community, as has already been done in the case of the medical experts. May we too not justifiably claim that the legislature should recognise the fact that the health of the teeth and associate parts is an essential factor in the maintenance of the health of the people and, therefore, an interest not less national than personal, to be guarded against casualties and ignorant neglect.

In concluding his chapter on Preventable Disease, Dr. Wilson thus appeals for the active and intelligent co-operation of the people themselves in improving and maintaining their health. "Many, too, look hopefully forward to the vast benefits which would accrue if the relations between the public and medical profession, to which sanitary science owes so much, were entirely altered. Hitherto, the public generally have only enlisted the services of the profession when disease sets in, but it is contended, and with reason, that it would be a far wiser policy to pay the medical attendant so much a year, and thereby enlist his services in conserving the health of the household. To a certain extent this policy is already carried out in club-practice and provident dispensaries, but there would be no difficulty in carrying it out as regards all classes of the community, if people could only be persuaded that it would be to their ultimate advantage, while the rate of remuneration to be paid to the medical attendant could be easily arranged on a fair and equitable basis. For it need hardly be said that so long as medical men are paid solely and simply for attempting to cure, it is obviously not to their interest to exercise their knowledge and skill in preventing disease, true though it be that the efforts of the profession generally are seldom lax in controlling those diseases which, without their intervention, would be sure to spread. Nor should it be overlooked that there is a long list of other diseases, appertaining to the domain of domestic

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hygiene such as those resulting from a vitiated heritage, intemperance, errors in diet, and irregular habits or modes of life, which might be largely controlled if the services of the medical practitioner were thus enlisted in the grand policy of prevention. But, unfortunately, the public credulity in the power of cure still reigns paramount, while their faith in prevention lies practically dormant; and hence it is that quackery of every description continues to thrive, and the pills and potions which are so extensively advertised find a ready sale. This, however, is a matter in which the people themselves must take the initiative, and it has only been adverted to here in order to show how curative and preventive medicine might cordially go hand in hand for the promotion of the public health and the abatement of human suffering."

How often does not the earnest thinking dental practitioner deplore the fact that from the results of neglect the main function of his professional life is monopolised by long, tedious and often painful operations wearying alike to patient and operator, the outcome the result of having to treat the advanced lesions which have led to more or less suffering, and rendered imperative the resort to the dreaded dental visit? Does he not ardently long for the wider spreading of that intelligence and common sense, unhappily as yet only displayed by a few even amongst the best educated and most prosperous classes, which will lead to his being employed in the treatment of these diseases in their initial stages before the suffering has been endured, when a short and comparatively trifling operation will give the maximum of comfort and durability at the minimum expenditure of time and of money on the part of the patient, and of his own limited amount of nervous energy and force.

Professor Parkes has pointed out that in cases where the rule of hygiene could not be followed out by the individual, the State steps in for the protection of its citizens, and enacts rules which shall be binding on all. "Hence arises what is now termed 'State Medicine,' a matter of the greatest importance. The fact of 'State Medicine' being possible, marks an epoch in which some sanitary rules receive a general consent, and indicates an advancing civilisation. Fear has been expressed lest State medicine should press too much on the individual, and should too much lessen the freedom of personal action. This, however, is not likely, as long as the State acts cautiously, and only on well-assured scientific grounds, and as long as an unshackled press discusses with freedom every step.

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"A watchful care over the health of the people, and a due regulation of matters which concern their health, is certainly one of the most important functions of Government. The fact that, in modern times, the subject of hygiene generally, and State medicine in particular, has commenced to attract so much the public attention, is undoubtedly owing to the application of statistics to public health. It is impossible for any nation, or for any Government, to remain indifferent when, in figures which admit of no denial, the national amount of health and happiness, or disease or suffering is determined. The early Statistical Reports of the Army, by Tulloch, Marshall, and Balfour, directed attention to the importance of this matter. . . . .

"When the effect of all these researches and measures develops itself, it will be seen that even great wars and political earthquakes are really nothing in comparison with these silent social changes."

Is it too much to demand that State Medicine should include State Dentistry? I think not. It is both the duty and the interest of the State to protect the helpless child from the results of dental as well as other disease, whether arising from the ignorance, the neglect, or the incapacity of the parents to provide the necessary treatment. In this consideration the very important fact should be recognised, that from a lack of attention in the period of their youth, men and women of the future are allowed to grow up with the inevitable certainty of future suffering, a large proportion of which can only be radically treated between the ages of from ten to fifteen years. This naturally brings us to the consideration of Mr. Fisher's contention for the compulsory attention to the teeth of school children. No intelligent reader, whether professional or otherwise, can fail to admit that he succeeds in proving his case. Let me recall to your minds some of his facts. On examination of the mouths of the boys on board the "Mars" Training Ship, he found only 80 absolutely perfect mouths, while over 300 required the care of a dental surgeon. It is important to remember that this is the condition of affairs found in a strong healthy lot of boys, ranging from 10 to 16 years, so you can readily imagine what must be the condition under less favourable circumstances. It must be of concern to our legislature that many of these boys were rejected for the Royal Navy from the inefficiency of their dental armature, an inefficiency which there is no question the services of a scientifically educated dental surgeon could have easily removed.

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In the Dundee industrial school for girls, out of a total number of 85, ranging in age from 7 to 16 years, he found 15 perfect mouths, leaving 70 requiring care or treatment; yet his conclusion was that this school has relatively a high percentage of good teeth.

In order to attract more general attention to this subject, I certainly think we ought to collect more statistics. If we could interest some of our senior dental students in this question, under the direction and superintendence of more experienced practitioners, they might devote a portion of their vacation to compiling statistics, alike with profit to themselves, the profession, and the public. It seems, however, that the permission to make such examinations is sometimes absolutely refused. Despite the support of the Army Medical Officer in Charge, I have been as yet unable to obtain permission for the examination of the boys in the Royal Military Asylum at Chelsea, which would be a valuable addition to our statistics, more especially as many of these boys afterwards join the army.

Some will be inclined, perhaps, to scout the proposition of compulsory attention as visionary and utopian, while others, admitting the advantages of such a scheme, may think they dispose of the question by stamping it as "rank socialism." Again, many hearty sympathisers with this great project, are at once taken aback by the economic difficulties of its institution. It is no use disguising the fact that this latter is a most serious aspect of the question; everyone will be quick to recognise the increased charge upon expenditure, but comparatively few have the power which you possess of realising that it would be rather a mere transfer of liability already incurred in some other way, if not an absolute saving of expenditure in other directions. Without referring to the action which some of the American dental societies have taken in promoting attention to the teeth of school children, in France, where no powerful association such as ours exists, measures have been taken for the inspection and care of the teeth of children in the schools of Paris. The question may indeed be postponed for a time, but a sense of patriotism should urge us on to be leaders rather than followers in a movement which time itself will hurry on.

The compulsory nature of the scheme may excite a certain amount of opposition, the opposition to the present compulsory vaccination laws being quoted as an illustration. The case is not at all analogous, for it would be impossible at any time

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to make out the faintest shadow of a case such as that which may, no matter how unadvisedly, be made against vaccination in opposition to the measure we propose. Individual cases of resentment would be certainly rarer under a compulsory than under any permissive scheme.

The knowledge you already have, or ought to have, of the contents of Mr. Fisher's papers, may absolve me from making any further comment, except that I trust in the discussion you will treat it with that fulness which the magnitude and importance of the question merits.

Professor Parkes remarks: "Looking only to the part of hygiene which concerns the physician, a perfect system of rules of health would be best arranged in an orderly series of this kind.

"The rules would commence with the regulation of the mother's health while bearing her child, so that the growth of the new being should be as perfect as possible. Then, after birth, the rules (different for each sex at certain times) would embrace three epochs; of growth (including infancy and youth); of maturity, when for many years the body remains apparently stationary; or decay, when, without actual disease, though, doubtless, in consequence of some chemical changes, molecular feebleness and death commence in some part or other, forerunning general decay and death."

Whether we consider one or all of these several epochs of the life of the human being, it must be apparent to the most obtuse observer that no system of rules of health could ever be termed perfect which ignored the important role which the dental practitioner is capable of performing in all matters which pertain to the teeth and surrounding structures.

I shall now ask you to consider for a moment that part of the subject to which I have more especially devoted my attention, viz., how this important matter affects the Services. The great amount of attention which has been devoted to military hygiene has contributed in no small way to the general advancement of public health, so, I trust, will this section of our work, in which you are invited to co-operate, be found to intensify and promote the views enunciated by Mr. Fisher. To quote again from Professor Parkes: "In many cases again, the employer of labour finds that, by proper sanitary care of his men, he reaps at once an advantage in better and more zealous work, in fewer interruptions

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from ill-health, &c., so that his apparent outlay is more than compensated.

"This is shown in the strongest light by the army. The State employs a large number of men, whom it places under its own social and sanitary conditions. It removes from them much of the self-control with regard to hygienic rules which other men possess, and is therefore bound by every principle of honest and fair contract to see that these men are in no way injured by its system. But more than this; it is as much bound by its self-interest. It has been proved over and over again that nothing is so costly in all ways as disease, and that nothing is so remunerative as the outlay which augments health, and in doing so, augments the amount and value of the work done.

"It was the moral argument, as well as the financial one, which led Lord Herbert to devote his life to the task of doing justice to the soldier, of increasing the amount of his health, and moral and mental training, and, in so doing, of augmenting not only his happiness, but the value of his services to the country."

Apart from this general argument, which might easily be shown to apply to our special view, there can be no doubt whatever, that the Army Medical Department recognizes the advisability and the necessity of remedial treatment other than that by mere extraction. If this were not the case no provision would have been made for the supply of tooth-stopping and scaling instruments. The nature of the provision, however, is so manifestly absurd that, in calling attention to the fact, we are doing a service alike to the soldier, to the army surgeon, and to the already heavily burdened tax-payer. Who, until the other day, ever supposed that gold foil was provided for the filling of soldiers' teeth? Ask any army man you meet if he has ever known, or even heard, of any of that gold foil reaching the mouth of Tommy Atkins? In these days of Government enquiries, it might not be uninteresting to find out something about this misapplication of the nation's funds, for you, as experts, must recognise the utter impossibility of properly manipulating, not only the gold foil, but the amalgam and gutta percha also provided, with the absurd equipment of the instruments officially described as four scalers and stoppers and three excavators and roseheads. Nor is this all, not only are the materials provided absurd, and the equipment utterly inadequate, but the army regulations only provide for one such case to be kept at the head-quarters of each military district. The least intelligent

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inhabitant of this city will see the absurdity of the provision when he knows that the whole of Scotland constitutes but one military district. But even were the materials, the instruments, and the distribution of the equipment, all that we could desire, what is the use of it all if the army surgeon has had no training to furnish the necessary manipulative skill. The,. perhaps, too meagre opportunities of obtaining this dental training, have been neglected by the army surgeon in his medical student career, and no provision is made for it in the special training which he has to undergo at Netley.

I succeeded in interesting a retired lieutenant-general of the British army in this question. He very kindly gave me a personal introduction recommending my scheme, which led to an opportunity of discussing the matter with the Deputy Director-General of the Army Medical Department. With regard to giving the training at Netley, he with perfect justice remarked that there was nothing specially military in that of dental surgery, and his only recommendation was that instead of bringing force to bear upon his department, we should endeavour to bring the matter before the General Medical Council, as well as before the ordinary medical school authorities, with a view to making such a training compulsory.

A reference to my paper of last year, will show that this contention on the part of the department had been foreseen, and we expressed a strong opinion in favour of the very views now advanced by the department. We cannot help feeling, however, that now the attention of the department has been called to this very important question, they should recognise and put in force the power they undoubtedly possess of requiring all the army medical candidates to produce evidence of having received at least an elementary training in dental surgery.

My own impression is, that if proper steps are taken in this matter, it will be impossible for the department, when the subject is properly laid before it, to ignore a strong expression of opinion emanating from this Association.

In the opening address to the section of Public Hygiene, at the recent Dublin meeting of the British Medical Association, the Director-General of the Army Medical Department, contrasts the inferior physique of the men now offering themselves as recruits for the army, with those of twenty-five years ago. "The inferiority is shown by the difference in weight between the town

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and country-bred recruits, as well as by the greater frequency of rejection from insufficient capacity of chest, loss and decay of teeth, and diminutive stature." In order to prove this point he quotes certain figures, of which the following is an extract:—

Causes of Rejection.	1860-4.		1882-6.	
	Total No. Examined. 86,969	Ratio per 1000	Total No. Examined. 318,981	Ratio per 1000
	Total No. Rejected.		Total No. Rejected.	
18. Loss or Decay of many Teeth	1,140	13·11	2,975	9·33
Total rejected ...	32,324	371·67	132,563	415·58

It will be seen that notwithstanding his above statement the number rejected on account of teeth alone was 13.11 per thousand in the former period as against 9.33 per thousand in the latter. This is a seeming contradiction to the statement quoted above, but is possibly easily explained by the fact that the Short Service Army measure is in operation during the latter period, and that there is not the same necessity to exact so rigid a standard with regard to the teeth. There is no doubt that the Short Service System has had an important bearing in this respect. It must also be remembered that the chest measurements and the standard as to height, age, &c., being the first points to be considered, large numbers of these men never reach the teeth examination stage.

As the result of a careful and minute examination of the candidates in a London recruiting station, a very deplorable state of affairs was revealed. The statistics proved that each man had lost or would be the better for losing 3.36 and the existence of 4.09 carious teeth capable of preservation, giving a total average of 7.45 of defective teeth per man; 64 per cent. of the cases required scaling, while 70 per cent. were suffering from inflamed and ulcerated gums, and 27 per cent. with one or more cases of chronic abscess in the mouth. A calculation was also made that only 8 per cent. of these cases were such as were beyond the limits of remedial treatment, while of those who were accepted 98 per cent. would have been benefited by dental treatment on admission to the ranks.

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Is it not the business of the State to see that the recommendations of the late eminent Dr. Parkes, long Professor of Military Hygiene in the Army Medical School, are followed out to their practical conclusion since he has shown that it is bound by its self-interest, from the proof that nothing is so costly as disease, and that nothing is so remunerative as the outlay which augments health? The expenditure in the scheme we propose would not be great, it would certainly lead to the improvement of the health, comfort and efficiency of the soldier, and thereby might well be expected, in the long run, to diminish and not increase the total expenditure of the department.

With regard to the navy, a practical admission of a different nature exists, showing the necessity of conservative dental treatment being provided. The morandum for the guidance of recruiting officers published by Mr. Fisher in his first paper is still in force, with the exception that in the London district the Admiralty has extended the number of absent or defective teeth which disqualify a candidate from 5 to 7. This fact alone serves to intensify the importance of our present project whether regarded from the necessity of attention to the teeth in the services, or from the advisability of early attention to the children, since the majority of naval recruits come almost directly from the schools.

Another point of interest arises from the number of the teeth determined to disqualify, viz.: 5 or 7. As the teeth are symmetrically disposed in the jaws both in position and in number, it would be interesting to know why this oddity as to oddness exists. Which is the odd tooth with which the recruit can dispense, and where is it situated?

In December, 1885, the Admiralty entered into a contract with the authorities of the Dental Hospital of London, by which the latter, in consideration of a subscription of thirty guineas, undertook the dental treatment of all the recruits they might send during one year—34 marines, 14 boys, and one artificer were so treated; thus this number of desirable and in other respects efficient candidates, who would otherwise have been prevented, have been enabled to enter the Royal Navy and the Royal Marines. Is not this a tangible proof of the kind of service dental science can render the State? Nor should it be forgotten that this amount of service is small compared to what it might be. We have been given to understand that both the superintendent and the medical officer in charge at the recruiting station have reported favourably

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upon what was regarded as a mere experiment, so much so, that the contract has been renewed for another year. It is important also to note that the individuals themselves have expressed their great gratitude at the opportunity provided for conservative dental treatment, thereby giving them a fair start in the service, and only in one case has such an opportunity been refused.

While expressing our profound satisfaction at so practical a recognition of the benefits derivable by the State from the services of the dental practitioner, we must enter a protest at the nature of the recognition. Is it fair for the State, instead of employing the services of a dental practitioner who, in accordance with the regulations of that very State itself, has expended a prolonged period of study at a considerable cost, to so avail itself of the advantages of a purely charitable institution mainly upheld by the profession itself, and where the operations are necessarily executed by dental students. Provided the services of fully qualified dental practitioners are employed, we would ardently recommend the Lords of the Admiralty to extend the scope of the experiment to the recruiting stations throughout the country, as the necessary corollary of the success of the present experiment. If a competent dental adviser were to be attached to the Admiralty Recruiting Department, we are convinced that he would soon be able to prove to the satisfaction of the Department that it would gain by increasing, rather than by diminishing the stringency of its provisions as to the teeth of the recruits, while at the same time there would be an extension of the number of eligible candidates.

We will now endeavour to frame a scheme, which will provide the means of promoting the general objects of this paper :—

(1) Some serious effort should be made for the elements of dental surgery, with a short practical training in the dental department of general hospitals, where the treatment should be conservative as well as radical, being included in the ordinary medical curriculum. The action of the Middlesex Hospital authorities in this direction is well worthy of example. No medical student at this hospital can be fully signed up for his hospital attendance, until he has completed a three months' attendance on the dental department. If the General Medical Council could be induced to take the matter up, this point would be quickly settled.

(2) The influence of that great public educator, the press, should be acquired, as the questions raised are really more of

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public than professional concern. Many of the most influential newspapers have already published strong and eloquent leaders on the subject, more especially as raised by Mr. Fisher. In one instance, however, an influential local newspaper refused to notice the matter, on the plea that neither the Association nor the interviewer advertised in its columns. Such too often is the ignorant and bigoted view, imposed by the commercial proprietor on a hard-working literary staff, when a serious effort is made to remove the subject "from professional seclusion to the region of popular interest and practice."

(3) As a profession we must do something to cultivate a higher intelligence in this matter throughout all classes of the people. Is it not better to expend our funds in promoting these objects, rather than in law expenses for the prosecution of offenders against the Dentists Act? Is it creditable to our profession that it has been slow, where the charlatan and the quack has been quick, to perceive the advantages to be gained by a wide distribution of popularised literature on the teeth.

(4) Dental Health Lectures would not only become popular, but in the shape of cheap reprints, would be the best defence to the pernicious influence of the quack compilations from our own literature. To meet a not unnatural feeling that one practitioner might thus be placed in an advantageous position, compared to his brother practitioners, any lectures on the subject should be delivered by some visiting practitioner from another locality, unless the local dental society or branch approve of one of their own number as lecturer. Of course, if a series of lectures of Medical Health exists in any town, that is the movement with which dental lectures should be associated. Any isolated and mere individual local action would be justly considered an infringement of professional ethics.

(5) Mr. Fisher's plea for the compulsory attention to the teeth of school children should be earnestly advanced. An increase in the number of such dental appointments as that at the Anerley Parochial Schools would do much to pave the way and create a confidence in, if not a desire for, the greater compulsory scheme.

(6) The insufficient but actual recognition already accorded to our special branch of surgery, in the army and the navy, warrants our bringing the matter prominently before the proper authorities. The most feasible plan would seem to be, to appoint an influential deputation of this Association to wait upon the Secretary of State for War and the Lords of the Admiralty.

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(7) An appropriate sphere for the further discussion of the questions broached in this paper, would be the medical and sanitary associations, but more especially the public health section of the British Medical Association. If some of those of our own members, who hold the necessary qualifications, could be induced to bring the matter forward in these new and as yet untried fields of discussion, a fresh and ever widening impetus would be given to the movement.

Canon Westcott, in a recent work "Social Aspects of Christianity," justly remarks, "that none can doubt in which direction the current of public thought is setting, that never before has there been so wide and keen a sense of the unity of life, of social dependence, of the obligation to determine our mutual relations by duties rather than by rights." The recognition by the State, in the regulation of our professional education and registration, entitles us as a profession to exercise the rights, thereby granted, in public service wherever we deem that professional help can serve the State. But is it not our duty, as well as our right, to agitate for the due recognition of preventive and remedial dentistry as an essential part of State medicine and public hygiene?

RESOLUTIONS.

That this meeting is of opinion :—

(1) That wherever the State provides medical services, dental services should be provided for, as an essential part of such medical provision.

(2) That, having regard to the great importance of securing competent attention to the teeth of the army and the navy, the Representative Board should consider the advisability of urging the Government to make suitable provision to that end.

(3) That considering compulsory attention to the teeth of school children would be a national gain, the Representative Board should be empowered to further the matter in any way they deem most fit.

Mr. PEARSALL: I am very glad to tell you that, benighted as Ireland is in many ways, it is a great deal ahead of some places in this country. The Dublin Dental Hospital receives a grant from the General Post Office for the dental attention given to the employés. The Postmaster-General had a great deal of trouble with the employés absenting themselves from ill-health,

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caused by bad teeth, and he had an interview with the Treasury, and a grant of money was given so that patients suffering from dental trouble might be promptly attended to, and the result has been that the 22 per cent. of absentees has been reduced to about 7 per cent. Then the Masonic Orphan Schools in Dublin are also placed under the control of the dental officers in Dublin. Sir Arthur Guinness & Co., also with the view of making their employés more comfortable, give a handsome subscription. There is one point that Mr. Cunningham might have dealt with. We take a deeper interest in the police in Ireland than you do here, and I think the police just require as much attention as the Army and Navy.

Mr. Ross Watt: I have great pleasure in supporting Mr. Cunningham's resolutions, and I would draw his attention to a class that I think he has over-looked, and one that I have given some attention to during the last 18 years—the county reformatories for boys. For the last 18 years I have attended to the teeth of the boys in the Warwickshire Reformatory gratuitously, and my position was never recognised till last summer. I have had half a dozen lads in a day sent over to have their teeth examined before passing the examination into the Navy.

Mr. Smith Turner: I think the importance of Mr. Cunningham's paper cannot be over-estimated, and I hope the Association will consider it its duty to try and keep the question before the public through the medium of the press till we can make some representations to the authorities. I think there is no use going to the authorities till a healthy public opinion is created.

Mr. Brown Mason: I have much pleasure in moving that the three resolutions made by Mr. Cunningham be adopted by the meeting.

Mr. King: I have very great pleasure in seconding the proposition.

Mr. Cunningham: Mr. President and Gentlemen, It is very important to know that the Dental Hospital of Dublin is being used by the State, and that the General Post Office of Dublin goes the length of £10 by way of recognition of the Dental practitioner, but we cannot be satisfied with that, except as the best possible evidence of the practical nature of our contention as to State Dentistry. Such facts prove that our views are neither so visionary nor so utopian as are sometimes asserted. The statistics of the results of that dental attention on the health of the Post

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Office employés is extremely valuable, and I think we ought to have more statistics of that kind. With regard to the Dental Hospital of Ireland, there is one fact to which I should like to call your attention, and that is that it was the first to introduce the short course for army and navy surgeons. The London Dental School, for some reason or other, thinks it better to discourage, a short course of this kind. I am glad to know that the Irish masons are ahead of us on this question, and I would like to call attention in Protestant Scotland to the fact that the Roman Catholics, in their convents and other places, pay more attention to the care of children's teeth than the Protestants in their schools.

I hope that you will adopt the very moderate resolutions which I have proposed, and that the Representative Board will find some means of giving them force.

The President then put the resolutions to the meeting, when they were unanimously adopted.

The 1888 Meeting.

THE PRESIDENT: There is one communication which I should like to read to you, and it is contained in a letter from a gentleman in Birmingham, writing to a member of the Association, a representative of the Irish Branch. "I hear that you are to have the British Dental Association in Dublin next year, having beaten us by three votes. Accept our best wishes, and be sure that the majority of us will come over to enjoy a visit to your fine city next August."

The Demonstrations.

The members of the Association then went to the Dental Hospital, George Square, where Mr. Kirby demonstrated his electrical mallet and engine, and other members performed operations.

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The Excursion.

At 9.30 on Saturday morning about 150 members and their friends, including ladies, assembled at the Queen Street Railway Station, and travelled thence by special train to Dumbarton. Arriving there they made their way to the large ship-building yard of Messrs. Denny Bros., one that has helped to make the Clyde famous throughout the world for its special branch of industry. There they met with a most courteous reception, and were personally conducted by Mr. John M. Denny, one of the partners of the firm, over the works.

The selection of such a visit was a most happy one on the part of those who were responsible for the day's proceedings; anything in the way of mechanics is sure to find a responsive chord in the mind of a dentist, and the interest displayed was quite equal to what would be expected. It would be tedious, almost impossible to enter into detail; everything was to be seen in connection with ships and ship-building, and could be observed in operation, from the preliminary model of the hull of the future ship cast in paraffin wax—through all the stages in the framing and construction of the ship, its plating and sheathing—down to its final fittings and decorations. The transition in passing from one to the other of the different departments was sometimes almost startling. In one building a huge steam hammer would be seen at work, welding together large plates of white-hot iron, while in another would be found delicate mathematical instruments, where, as in the case of a galvanometer, such a material element as weight would be entirely eliminated, the functions of the ordinary needle being effected by a beam of light. At the conclusion Mr. Denny led the way to a large hall, where he had most liberally provided light refreshments and champagne for his guests, and acknowledged in a most graceful speech the warm thanks which Mr. Brownlie tendered to him on behalf of the Association for his kindness and courtesy.

An adjournment was then made to the steamer, "Shandon," which was lying off the pier in waiting, but it was destined to wait for a short time, as a large East Indian craft blocked the channel outwards. The merchantman, however, eventually moved sufficiently, and the "Shandon" steamed out into open water towards Greenock, where a second contingent was waiting its arrival, and gladly hailed its approach. The day was now well established, and

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any doubts as to the intention of the sun to shine were entirely removed. The sail up Loch Long was a most beautiful one; the lights and shadows cast upon the purple, heather-clad hills by the passing clouds showed them off to their best advantage, and the blue waters of the loch beneath and the blue sky above combined to form a picture which many will ever remember among their pleasantest associations.

Lunch was served on board in a most satisfactory manner, and to judge by the alacrity with which the call bell was responded to there seemed little doubt but that everyone was quite ready for it. Arriving at the head of the loch a halt was made, a small party disembarked *en route* for the northern Highlands, and the vessel then turned and steamed homewards. The return journey was an equally pleasant one, enlivened by some excellent music from the band in the after part of the boat, till, on reaching Greenock, a large detachment left, including the President, who received a most enthusiastic and hearty cheer. At Dumbarton the trip came to an end, and after walking from the pier to the station the "special" was brought out from the siding, and in due time Glasgow was again reached.

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The following is the list of Donations and Subscriptions obtained at the Annual Dinner at Glasgow :—

Benevolent Fund, 1887.

Jubilee Donations.

	£	s.	d.
Eastern Counties Branch, per — Coxon, Esq.	£10	10	0
Hutchinson, S. J., Esq., 64, Brook Street, London, W. ...	10	10	0
Rogers, Richard, Esq. and H. P. Fernald, Esq., Alma House, Cheltenham	10	10	0
Saunders, Sir Edwin, 13A, George Street, Hanover Square, London	10	10	0
Sherwood, Martin, Esq., Oxford	10	10	0
Smale, Morton, Esq., 89, Seymour Street, W.	10	10	0
†Stack, R. Theodore, Esq., 10, Westland Row, Dublin ...	10	10	0
*Western Counties Branch, per J. T. Browne-Mason, Esq.	10	10	0
West of Scotland Branch, per J. R. Brownlie, Esq. ...	10	10	0
"Anon." Glasgow (A Friend)	10	0	0
Ewbank, F., Esq., 24, Queen Anne Street, London ...	5	5	0
Tomes, C. S., Esq., 37, Cavendish Square, London ...	5	5	0
*The Lord Provost of Glasgow	2	2	0
*Alexander, D. M., Esq., 117, Wellington Street, Glasgow	1	1	0
Biggs, John A., Esq., 46, Great George's Road, Glasgow	1	1	0
*Browne-Mason, J. T., Esq., Exeter	1	1	0
*Fothergill, Wm., Esq., Darlington...	1	1	0
*Kirby, Amos, Esq., Bedford	1	1	0
*Shillinglaw, Wm., Esq., Birkenhead	1	1	0
White, Thos. Charters, Esq., 32, Belgrave Road, London	1	1	0
Wilson, Andrew, Esq., Edinburgh	1	1	0
Woodiwis, W. Somerville, 1, Tower Street, Hartlepool ...	1	1	0
*Pearsall, W. B., Esq., Dublin	1	0	0
Browne-Mason, C., Esq., 2, West Park Terrace, Scarborough	0	10	6
Fothergill, J. A., Esq., Darlington	0	10	6
Kluht, Henry J., Esq., 44, Norfolk Terrace, W.	0	10	6
*Dall, W., Esq., 4, Newton Terrace, Glasgow	0	10	0
*Finlayson, M., Esq., Leith	0	10	0
*McGregor, M., Esq., Edinburgh	0	10	0
*Walker, P. S., Esq., 23, High Street, Dundee	0	10	0

Subscriptions.

	£	s.	d.
Ewbank, F., Esq. (for 1887 only), 24, Queen Anne Street, London, W.	5	5	0

* Paid. † Promised provisionally.

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Tomes, C. S., Esq. (for 1887 only), 37, Cavendish Square, London, W.	£5	5	0
†Smith, J., Esq...	2	2	0
Biggs, John A., Esq., 46, St. George's Road, Glasgow ...	1	1	0
Browne-Mason, C., Esq., 2, West Park Terrace, Scarborough	1	1	0
Campion, G. G., Esq., 264, Oxford Road, Manchester ...	1	1	0
*King, R. F. H., Esq., Newark	1	1	0
*King, Roff, Esq., Shrewsbury	1	1	0
*McStay, J., Esq., 39, King Street, Belfast...	1	1	0
*Sherwood, Martin, Esq., 17, Beaumont Street, Oxford ...	1	1	0
Storey, John Charles, Esq., Hull	1	1	0
*Woodiwis, W. Somerville, Esq.	1	1	0
Yeates, G. W., Esq., 24, Lower Bagot Street, Dublin ...	1	1	0
*Andrew, J. J., Esq., 2, Belgravia, Belfast	0	10	6
*Coxon, A., Esq.	0	10	6
*Payling, R., Esq., Peterborough	0	10	6
Rymer, James, Esq., 10, Bentinck Street, Manchester Square	0	10	6

The Hon. Treasurer of the Benevolent Fund of the British Dental Association has received the above list of subscriptions and donations given and promised at the dinner of the British Dental Association, at Glasgow, and believes that it is correct; should any item, however, not be so, he will be glad to hear from the donor and will rectify the error.

* Paid. † Promised provisionally.

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TRANSACTIONS

OF THE

British Dental Association,

AT ITS

Eighth Annual General Meeting,

HELD IN

DUBLIN,

On THURSDAY, FRIDAY and SATURDAY,

AUGUST 23rd, 24th and 25th, 1888.

REPRINTED FROM THE JOURNAL OF THE ASSOCIATION.

London:
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CONTENTS

PAGE

American Dental Association, The 97
Anæsthesia, Dr. Anthony Corley on 36
Baker, Dr. Arthur, on the Annual Museum and its Contents ... 49
Benevolent Fund, The 64
Brownlie, Mr., Valedictory Address of 20
Business Meeting, The 8
Conversazione, The 140
Corbett, Mr. Daniel, Opening Address of 26
Corley, Dr. Anthony, on Anæsthesia... 36
Cunningham, Mr. George, on Implantation of Teeth 100
Demonstrations, The 63
Dental Aspect of Public Health. Reports of the Sub-Committees on the 15
Dental Ethics, Dr. Theodore Stack on 32
Dinner in Hall at Trinity College, The 140
Dinner, Representative, of the Dental Fellows and Licentiates of the Royal College of Surgeons, Ireland 1
Garden Party, The President's 62
Guinness's Brewery, The Visit to 144
Howth Bailey Lighthouse, The Excursion to 148
Implantation of Teeth, Mr. Geo. Cunningham on 100
Kirby, Mr. Amos, on Some Properties of Amalgam 87
Members present, List of 2
Murray, Mr. G. M. P., on Section IV. of the Annual Museum and its Contents 82
Museum, The Annual 4
Museum and its Contents, The Annual, Dr. Arthur Barker on ... 49
Pearsall, Mr. Booth, on the Use of Imagination in the Construction and Design of Artificial Teeth 73
Reports of the Sub-Committees on the Dental Aspect of Public Health 15
Representative Board Meeting, The 7
Section IV. of the Annual Museum and its Contents, Mr. G. M. P. Murray on 82
Some Properties of Amalgam, Mr. Amos Kirby on 87
Stack, Dr. Theodore, on Dental Ethics 32
Use of the Imagination in the Construction and Design of Artificial Teeth, Mr. Booth Pearsall on the... 73
Watts, Mr. A. J., on Some Workroom Appliances 97

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APR 1 - 1914
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British Dental Association.

REPORT OF PROCEEDINGS

AT THE

ANNUAL GENERAL MEETING,

HELD IN DUBLIN,

On THURSDAY, FRIDAY and SATURDAY,

August 23rd, 24th and 25th, 1888.

[REPRINTED FROM THE JOURNAL OF THE ASSOCIATION.]

THE Annual General Meeting of the Association was held this year in Dublin, at the School of Physic, Trinity College, the Royal College of Surgeons in Ireland, and the Royal University of Ireland, on Thursday, Friday, and Saturday, August 23rd, 24th, and 25th.

Although the official programme did not commence until the Thursday, and in fact the greater number of the members did not arrive until late on Wednesday night or early on Thursday morning, the hospitality of our Irish entertainers could not wait till the formal commencement of the meeting. As the Association was holding its annual meeting in Dublin this year, it was thought desirable to hold at the same time the first Representative Dinner of the Dental Fellows and Licentiates of the Royal College of Surgeons, Ireland. A committee had been formed for the purpose of carrying out this scheme. A copy of those holding the L.D.S., R.C.S.I., up to date had been obtained from the College Register, and an invitation sent to every member. The President and Council of the Royal College of Surgeons, Ireland, very courteously and kindly placed the use of the College for that purpose at the disposal of the Committee. Accordingly on the Wednesday night some of

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the prominent members who had already crossed the channel experienced a foretaste of what was in store for the meeting in general in the shape of a very pleasant dinner at the Royal College of Surgeons in Ireland. It is needless to say much about the dinner itself, the name of Michell on the *menu* will tell its own tale. The chair was occupied by the President of the College for the present year, Mr. Henry Fitzgibbon, while among the guests present were the ex-president of the College, Mr. Anthony H. Corley and others. The speeches were interesting in many respects, and we may summarise the general effect of this preliminary re-union by saying that it sufficed to show the intimate relations of mutual respect and social friendship that exist in Dublin between the purely surgical and the specially dental sections of the medical profession; this thought must have been uppermost in the minds of more than one of the English guests of that evening, but the actual expression of it was reserved for a visitor from Harvard University—Dr. Grant—who, in a very effective speech, paid his tribute to the high social standing of dentistry in Ireland.

We will not linger longer over the speechifying at this dinner, seeing that it was in a measure informal; those of us who were fortunate enough to be present will not readily forget the conviviality, the happy little impromptu speeches, the music (we had practical evidence that for Scotchmen and Irishmen at least, neither professional eminence, literary labours, nor the cares of the Association are incompatible with fine singing), in fine, the general *entente cordiale* of what we may perhaps call the dress rehearsal of the annual festivities.

Thursday, August 23.

On Thursday morning the business of the meeting commenced. Mr. J. R. Brownlie (Glasgow), President in the chair. The following gentlemen signed their names as having attended, in the book provided for the purpose:

Alexander, M., Liverpool.
Amoor, J. S., Edinburgh.
Andrews, J. S., Belfast.

Bacon, W. B., Tunbridge Wells.
Bailey, J. J., Guildford.
Baker, A. W. W., Dublin.

Balcomb, T., Jersey.
Baldwin, H., London.
Balkwill, F. N., Plymouth.
Beers, W. G., Montreal.
Bennett, Storer, London.
Biggs, J. A., Glasgow.
Birch, J. Charters, Leeds.

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Blandy, H., Nottingham.
Bloom, M. J., Dublin.
Broughton, W., Manchester.
Browne-Mason, Charles, Scarborough.
Browne-Mason, J. T., Exeter.
Brownlie, J. R., Glasgow.
Brunton, George, Leeds.
Buckley, T., Oldham.

Cameron, Donald R., Glasgow.
Campbell, Walter, Dundee.
Campion, G. G., Manchester.
Canton, F., London.
Clarke, Eugene C., Bangor.
Clarke, J. C., Belfast.
Coffin, Walter, London.
Cole, J. F., Ipswich.
Cooper, C. H., Bradford.
Corbett, Daniel, Dublin.
Corbett, Daniel, Jun., Dublin.
Corbett, J. F., Dublin.
Corbett, W. C., Cork.
Coxon, Stephen A. T., Wisbech.
Crapper, J. S., Hanley.
Cunningham, C. M., Dublin.
Cunningham, G., Cambridge.

Dale, F., Sheffield.
Dennant, J., Brighton.
Dilcock, T., Liverpool.

Egan, L. J., Cork.
Elwood, W. H., Belfast.

Fernald, H. P., Cheltenham.
Finlayson, M., Edinburgh.
Fisher, William, Dundee.
Fothergill, J. A., Darlington.
Fothergill, W., Darlington.
Franks, F. A., Liverpool.

Gaddes, T., London.
Gartrell, J. H., Penzance.
Gaskell, F., Dublin.
Gaskell, W. F., Liverpool.
Greenfield, J., London.
Grove, R. N., Walsall.

Harding, W. E., Shrewsbury.
Harrison, F., Sheffield.
Harrison, R., London.
Hazleton, R., Dublin.
Helyar, W., Bristol.

Headridge, T., Leeds.
Headridge, W., Manchester.
Hepburn, D., London.
Holford, J. J., London.
Houghton, Edwin, Manchester.
Huet, F. A., Manchester.
Hunt, W. A., Yeovil.
Hutchinson, S. J., London.
Huxley, F. E., Birmingham.

Johnson, M., Chester.
Jones, A., Cambridge.
Jones, A. A., Stamford.
Jones, J. H., Manchester.

Kekwick, J. F., Carlisle.
Kelly, W., Manchester.
King, R. F. H., Nottingham.
King, Roff, Shrewsbury.
King, T. E., York.
Kirby, A., Bedford.
Kluht, H. J., Bayswater.

Ladyman, W., Liverpool.
Lennox, R. P., Cambridge.
Lodge, G. H., Rotherham.

M'Adam, G. C., Hereford.
M'Call, J. H., Leicester.
M'Clean, F., Dublin.
M'Stay, J., Belfast.
Macleod, W. B., Edinburgh.
Mallet, H., Exeter.
Mansell, T., Birkenhead.
Manton, J. N., Wakefield.
Mason, H., Exeter.
Matthews, A. A., Bradford.
Merrilees, Charles, Dublin.
Moore, R., Dublin.
Mummery, J. H., London.
Murray, G. M. P., Dublin.

Neale, W. H. B., Birmingham.

O'Duffy, J., Dublin.
O'Keeffe, H., Cork.
Osborne, G. H., York.

Parkinson, George, London.
Payling, R., Peterborough.
Pearsall, W. Booth, Dublin.
Penfold, W., London.
Petherbridge, J., Dundee.
Pike, J. L. F., Sheffield.

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Price, Rees, Glasgow.
Pritchard, J. W., Glasgow.

Quinn, W. D., Dublin.

Read, T., London.
Reeves, S. G., Dublin.
Renshaw, I., Rochdale.
Rhodes, W. A., Cambridge.
Richards, F. W., Birmingham.
Rilot, C. F., London.
Rippon, Charles, Huddersfield.
Robbins, C., London.
Rogers, C., Wexford.
Rogers, R., Cheltenham.
Rowney, T. W. F., Derby.

Sandes, J. J. H., Devon.
Senior, J. W., Huddersfield.
Sherwood, M., Oxford.
Simms, W., Manchester.
Sims, C., Birmingham.
Smale, M., London.
Smith, A., London.
Smith, C. M. C., Dublin.
Smith, J., Edinburgh.
Smyth, Samuel, Londonderry.
Stack, R., Theodore, Dublin.
Stirling, J., Ayr.
Stocken, J., London.
Stokes, C., Sheffield.
Storey, J. C., Hull.
Street, G. H., London.
Studley, T. F., Dublin.

Tomes, C. S., London.
Thomson, Joseph S., Dublin.
Tucker, C., Dublin.
Tucker, J. S., Dublin.
Turner, J. S., London.

Underwood, Arthur S., London.

Verrier, A. B., Weymouth.
Vice, W. A., Leicester.

Waite, W. H., Liverpool.
Walker, J., London.
Wall, Charles, Dublin.
Wallis, G., London.
Watts, Arthur, Dublin.
West, Charles, London.
White, T. Charters, London.
Whittaker, G. O.
Williams, E. Lloyd, London.
Williams, E. H., Manchester.
Williams, Herbert, Londonderry.
Williamson, William H., Aberdeen.
Wilson, Andrew, Edinburgh.
Woodhouse, R. H., London.
Woodruff, W. H., London.
Wormald, S., Stockport.

Yeates, G. W., Dublin.

Also the Rev. Dr. Haughton, Dr. Corley, Dr. Macnamara, and a number of other members of the Irish medical and surgical professions.

The Annual Museum was opened at the School of Physic Trinity College, at 9 o'clock. The room devoted to it was admirably adapted for the purpose; there was every facility offered for those who wished to inspect the specimens, and the specimens themselves were of very great interest. On another page our readers will find Dr. Baker's own account of the three sections to which he was Secretary, and Mr. Murray's account of the workroom section for which he performed the same office.

Those who wish for detailed information on the subject are therefore referred to these papers, where they will find the record compiled by those upon whom fell the lion's share of the labour

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of arrangement and classification. We cannot omit to mention, however, that here as elsewhere we detected ample evidence that the Hon. Secretary of the branch had had his finger in the pie, those delightful bottle-racks being among other things traceable to his inventive genius.

The room was divided into four sections, viz., manufactures, literature, surgical, and work room. The surgical section contained over eight hundred specimens of abnormal teeth. Each specimen was enclosed in a little glass tube, and placed on a mahogany rack designed by Mr. Booth-Pearsall. By this arrangement all the specimens could be satisfactorily examined within a comparatively brief space of time. On adjoining racks there were numerous plaster models showing irregularities of teeth and cases of cleft plate. The apparatus used in treating cases of cleft palate were also exhibited, together with antique dental instruments, some of them dating as far back as the sixteenth century. Among other ancient exhibits there were dentures carved in ivory, dentures with natural teeth inserted in ivory, and dentures with artificial teeth set in ivory. In the Human and Comparative Pathological Section, the specimens included a gorilla's head with a large canine tooth in the ramus of the lower jaw—the only specimen of the kind known. Casts of the bones of the Hesperornis Regalis, a bird with teeth, had been lent to the Association by Professor Sollas, and they found a place in the museum. The bird was only recently discovered in America by Professor Marsh, and its bones are at present in Yale College. Professor Bennett supplied a number of specimens, showing the effects of rheumatic arthritis on the jaws and teeth. The head of a pug dog occupied a place on one of the racks. The teeth of the dog were covered with tartar, and the sockets were absorbed. This never occurs in the animal in its wild state, and only a few cases of the kind have been discovered in pet dogs. On the same rack there was a tooth in the lower jaw of a marmot with odontome connected with the end of the root of the left incisor. In this section there were many curious specimens, which appeared to possess more than a passing interest even for visitors unconnected with the profession. The majority of them had been temporarily placed at the disposal of the Association by the Odontological Society of Great Britain, Trinity College, and the Royal College of Surgeons. In the workroom there were all kinds of appliances for the rapid execution of work, including the latest designs in

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seats, lathe heads, vices, and other requisites. On the walls of the museum there were exhibited excellent photographs by Mr. J. Howard Mummery, of London, showing the interglobular spaces in dentine, and the passage of the dentinal tubules across the spaces. Transparencies, furnished by Mr. Andrew, Belfast, illustrated various phenomena in cleft palate, and dental anatomy and pathology.

Opening out of the museum was a spacious room in which, by the kindness and courtesy of the Secretary of the General Post Office, Dublin, a temporary post office had been erected, where letters and telegrams could be received and dispatched. Stamped stationery and every other convenience was here placed at the service of members, who were just as well off in this respect as the members of a good club from 9 to 5 on each day of the meeting. Hard by was the General Enquiry Office, where from an early hour on Thursday morning, enquiries, sometimes apparently more "general" than could be wished for the sake of the over-harassed Hon. Secretary, poured in incessantly. To judge from the face and demeanour of those enquirers, who had asked "not wisely but too well," this was a very warm corner for the unbusinesslike, always a considerable element in such a gathering.

Not far from the enquiry office was the splendid laboratory of physiological research, where Dr. Arthur Baker was able, through the kindness of Professor Purser, to show sixty-nine microscopes. This exhibition was quite unique of its kind. Mr. Charters White, of London, showed an interesting series of slides, accompanied with microphotographs of each slide, while Dr. Baker, Mr. Andrew, of Belfast, Dr. Martini, of Turin, and Mr. Arthur Underwood all exhibited very interesting slides. These remained on view until the Saturday.

On the Thursday and Friday a magnificent luncheon was provided in the dining hall of Trinity College, where the ladies and gentlemen of the party met at 1.30, or we should say, were supposed to meet at 1.30, for on the Friday the gentler sex exercised their privilege of being late, and while the unattached male element sauntered forth from their luncheon about half-past two, the married men might still be seen lingering and hungering in expectation of the arrival of the cavalcade. After the Thursday luncheon the party was photographed on the steps of the dining hall; the result being a capital group.

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Meeting of the Representative Board.

THE Representative Board met in the Board-room of the Royal College of Surgeons in Ireland, on Thursday, August 23rd; Mr. J. SMITH-TURNER in the chair. The following members of the Board were present:—J. Smith-Turner, Esq., President, in the chair; Messrs. Storer Bennett, F. Canton, W. H. Coffin, S. J. Hutchinson, G. W. Parkinson, C. West, E. Lloyd Williams, and Morton Smale (hon. sec.), of London; W. Bowman Macleod and Andrew Wilson (Edinburgh), J. A. Biggs, J. R. Brownlie, and Rees Price (Glasgow), W. H. Williamson (Aberdeen), C. Sims (Birmingham), J. Dennant (Brighton), W. H. Rodes (Cambridge), T. Cooke Parson (Clifton), H. B. Mason (Exeter), J. Fenn Cole (Ipswich), Henry Blandy (Nottingham), F. H. Balkwill (Plymouth), W. E. Harding (Shrewsbury), S. Lee Pike (Sheffield), W. A. Hunt (Yeovil), and T. E. King (York).

The PRESIDENT stated that the report of the sub-committee on the Dental Aspect of Public Health would be read by Messrs. Cunningham and Fisher at the Annual Meeting.

The SECRETARY stated that Mr. Partridge, and Messrs. Coe and Huntley, of the American Dental Institute, had been prosecuted for using titles signifying that they were registered, and in each case had been fined £5 and costs.

The following resolution, sent up to the Board by the Scottish Branch, and supported by the Eastern and Southern Counties Branch, was considered:—"That the Representative Board be asked to approach, or take such steps as are open to them, to move the Commission appointed in connection with the Universities (Scotland) Bill, to empower the Universities of Scotland to institute a degree in dentistry." After some discussion it was decided, on the motion of Dr. WILLIAMSON, to leave the matter in the hands of the Business Committee.

The HON. TREASURER stated that there was a balance of £766, and that 151 members were in arrears for one year, and 17 for two years.

It was decided to recommend that the Annual Meeting for 1889 be held in Brighton, and that Mr. Lee Rymer be President-elect; and that both dates—August 22, 23, 24, and August 29, 30, 31—be submitted to the meeting, for the members to select the most convenient to the majority.

Mr. W. BOOTH-PEARSALL, the Hon. Secretary of the Irish Branch, arriving at the meeting, was received with applause. He,

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in the name of the President and Council of the Royal College of Surgeons, welcomed the members to the College.

A case of infringement of Act, sent up to the Board by the West of Scotland Branch, was, on the motion of Mr. West, seconded by Mr. Hutchinson, referred to the West of Scotland Branch, to be dealt with, permission being given for that Branch to prosecute, if necessary.

The following members of the Association were nominated to be recommended to the Annual Meeting for election to the Representative Board, in the place of those who retired by rotation: For London: Messrs. J. Ackery, W. H. Coffin, J. Fairbank, W. Hern, and A. J. Woodhouse. For the Provinces: Messrs. J. A. Biggs, W. Campbell, J. H. Fothergill, B. Neale, J. H. Redman, and Theodore Stack. The name of Mr. E. S. Ash, of Dublin, was received as having been elected by the Irish Branch.

The following gentlemen were elected members of the Association:—Messrs. T. Headridge (Leeds), T. A. Tait (Tenterden), and F. M. Taylor (Liverpool). The election of one gentleman was postponed until the next meeting.

Mr. Dennant said that in view of the increasing growth of the Association and its multifarious interests, he thought steps should be taken to facilitate the business of its annual meetings, and he would give notice that he would move the following resolution at the next meeting of the Representative Board:—"That in future at the annual meetings of the Association, readers of papers or communications, or abstracts thereof be limited to 15 minutes, and that speakers thereto be restricted to 7 minutes; and that copies of such papers and abstracts be forwarded to the Hon. Secretary of the Representative Board at least twenty days prior to the date of meeting, for the approval of the Board."

The Business Meeting.

The chair was taken by Mr. J. R. Brownlie, L.D.S.Eng., the outgoing President.

The President said: I have much pleasure in opening this meeting by calling on Dr. Haughton to say a few words.

Rev. D. Haughton, S.F.T.C., F.R.S., said: Gentlemen, members of the British Dental Association, I am instructed by the Provost of Trinity College to explain his regret at not being able

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to receive you in person to-day; but he appointed me his deputy, and said that whatever I chose to say to you in the way of welcome he would heartily endorse. Therefore you will understand that I speak in the name of the Provost of Trinity College and not merely as an individual to-day. I told the Provost that I was rather a dangerous person to act as his deputy, because sometimes things come into my head that maybe ought to have stayed out of it, but so sure as ever they come into my head they come out of my mouth, and I reminded him of what he, as a Biblical scholar and great divine, knew much better than I did, the story of Baalam and his ass. I said: "Provost, remember that you are appointing an ass to speak in your place," and I quoted for him the words of the clever French play, based on the story, in which Baalam listens for some time most attentively to what the ass is saying and at last exclaims, "Good God, my ass speaks, and hang me but he speaks right well." And I am sure that I speak right well to-day when I say that in the name of the authorities of Trinity College, I am instructed to give you a most hearty welcome, and to throw open to you everything in the College that is to be seen. I understand that Professor Fitzgerald has undertaken to show the treasures of the library to any lady or gentleman who may wish to see them. I am quite sure that Dr. Reynolds, our Professor of Chemistry, whom I see present, will show everything in his department to the visitors who wish to see them. Professor Purser, though absent, has placed all his microscopes and resources under the direction of the Secretaries here, who will show everything in that department; and I may say that you will see for yourselves at our luncheon arrangements to-day, and to-morrow in the Dining Hall of Trinity College—those of you who dine at the College to-morrow—that everything that it is in our power to give has been placed at your disposal. So far as Trinity College and your Reception Committee are concerned, I think you will admit that we have done our best. There is, of course, one drawback—a falling barometer this morning—but as far as I can make out the rain won't come till to-morrow morning, and your excellent President, Mr. Corbett's, Garden Party will be a most brilliant and happy success, weather included. However, we have made arrangements in case heavy showers do come, that the Engineering Museum and the Library will be thrown open during the showers; but I hope that the greater part of the afternoon will be spent in the open air. Again, gentlemen, I heartily wish you welcome in the name of Trinity College.

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The PRESIDENT then called upon the Hon. Treasurer to read his report.

Mr. FREDERICK CANTON: There are, I regret to say, 151 members one year in arrear with their subscriptions, and seventeen are two years in arrear. Our balance is £766 12s., which is a very satisfactory one. At the same time I have not yet got in the law costs of the recent prosecutions; and the last defendant has given notice of appeal. If necessary, we shall have to carry that case to the House of Lords, which means a considerable expense, therefore I would ask members to let us have their subscriptions as soon as possible in order that we may know what balance we have to work with.

Dr. WALKER said he had pleasure in moving the adoption of the Treasurer's report.

Mr. BRUNTON seconded the motion, which was unanimously agreed to.

Mr. MORTON SMALE, Hon. Secretary, read the following report:—

The report which your executive have to present to you for the past year is one of exceptional interest. We venture to hope the members at large will feel gratified with the progress made, and realize more fully how important a factor in the well-being of our profession the Association has become.

The various Branches have been unusually active, and many important meetings have been held at various centres, and new ground broken up. The Irish, the Midland, and Eastern Counties Branches particularly deserve the thanks of the members for their good work.

The following paragraph in last year's report has been realised: "A case which has been considered very fully at various times both by your Board and Business Committee, has recently occupied a very public position, and although it has been again successfully contested against the Medical Council, the Master of the Rolls, in his summing up, pointed out a course at once dignified and efficacious for the removal of individuals so implicated from the Register; it is hoped that the Council may see its way to act on his suggestion." At the instigation of your Business Committee and the Royal College of Surgeons in Ireland, Mr. Partridge's name was erased from the Dentists' Register for unprofessional conduct. As subsequent to such removal he continued to use both the title of dentist and the letters L.D.S. in connection with his

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name, our solicitors, Messrs. Bowman & Crawley-Boevey, were directed to take proceedings against him, with the result that he was fined £5 and costs. Earlier in the year a Mr. Bradley, of Wisbech, was prosecuted, and also fined £5 and costs for calling himself, *viva voce*, a dentist. This was new ground of prosecution, and established a new precedent. Two gentlemen connected with the American Dental Institute have also been subjected to legal proceedings, their names not appearing on the Dentists' Register; but, inasmuch as they held the American diploma D.D.S., this also was a novel proceeding. They, like Mr. Bradley, were defended by Mr. Waddy, Q.C., and the magistrate took a week to consider his judgment. On Tuesday last he delivered it to the effect that they also should be fined £5 and costs. Making, therefore, three successful cases of prosecution during the year. The defendants have appealed to the magistrate to state a case for the opinion of the Court of Queen's Bench, and the leave has been granted; we are, therefore, launched into serious and costly legislation, and your executive relics upon every man to do his duty, and give all the support in his power, to those whose duty it is to carry this case, it is hoped, to a successful termination. Your Business Committee took steps to get these cases reported in the daily Press with the view to educate the public on the question of the status of our profession. During the year many cases of alleged infringements of the Dentists Act have been reported to your Honorary Secretary, and the Association has been successful, in no less than 10 cases, in causing the offenders to either cease practising altogether or to forego the assumed designations.

The list of members has been considerably elaborated, and as it must serve the convenience of everyone connected with the British Dental Association, your executive hope that the members individually will assist in maintaining it in its present state of efficiency, and where it can be improved help to improve it. A geographical Register has been prepared, probably it may prove more useful when the next Register is published, but up till now it does not seem to have been so much used by the Branches as it might have been. Your committee, supported by the West of Scotland Branch, took steps to prevent any exhibit of dental specimens at the Glasgow Exhibition; unfortunately we were not so forward in regard to one of the foreign exhibitions in London, and one of those disgraceful

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exhibitions of a dentist's workroom may be seen in working order: fortunately it attracts little notice.

One member of the Association, who had been guilty of somewhat involved and doubtful relations with an advertising institution, has been requested to resign, and he has since been reproved by the Council of the Royal College of Surgeons in Ireland, of which body he held the L.D.S.; it is hoped he may see his error, mend his ways and rejoin the Association.

At the suggestion of the Business Committee, the secretaries of the Branches have been elected members of that body by the Representative Board; but the privilege, up to the present time, your executive regret to say, has been very little appreciated, only one has attended and he only at one meeting.

The Journal continues to hold its high position amongst dental literature, in addition to being also the mouthpiece of the Members individually, and the Association. Mr. Arthur Underwood, the sub-editor, is to be congratulated on the able way he has fulfilled his duties.

The Association will be glad to hear that the authorities of Guernsey have passed an ordinance prohibiting in future any one practising dentistry in that island without being in possession of a diploma as L.D.S. from either England, Scotland, Ireland, or France.

The Representative Board has held its required number of meetings, and the Business Committee has met 14 times, its sitting usually lasting three or four hours. The numerical strength of the Association, has, thanks to the activity already referred to, largely increased. The number of members last year was 645, while to-day it is 750, showing an increase of 105. Ten members have been removed for non-payment of subscriptions, against nine last year, and there have been four deaths; the actual number of new members, therefore, during the year has assumed the grand total of 121. Many members of our profession have held aloof from the Association for the reason that your executive have exhibited great discretion in the matter of prosecutions, never during the nine years of its existence having suffered a defeat, demonstrating very clearly how well it has at all times been advised. It is to be hoped that those who, for the above reason, have not joined us, may in the light of the recent litigation see their way to throw their lot in with us, and help us by their presence and their purses—with the former, for unity is strength, and with the latter, for legal proceedings are expensive.

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The best thanks of the Association are due to the Council and enthusiastic and active Secretary of the Irish Branch for the very admirable meeting they have organised—a meeting that must do much to attract outsiders to our ranks, and raise our profession in the eyes of the general public, and place our Association on a sounder scientific basis. Your executive would finally wish to appeal to every member of the Association to resolve during the year to bring two recruits into our number, in order that at the annual meeting in 1889, it may be able to chronicle an even larger increase.

Rev. Dr. HAUGHTON remarked that the case of Mr. Partridge, which was mentioned in the report, came before the General Medical Council, and the sympathies of that Council were completely with the Dental Association in the matter. But the decision to which the General Medical Council came, was, greatly to the astonishment of the President, Mr. Marshall, set aside by the Master of the Rolls. He (Dr. Haughton) was in London at the time, and Mr. Marshall asked his opinion and that of others as to whether or not a special meeting of the Council should be called on the subject; but they agreed that it would be better to wait until the meeting of the Council in November next. Of course proper steps should be taken by the Association to bring the matter before the Council then.

Mr. BOWMAN MACLEOD said he had very much pleasure in moving the adoption of the Secretary's report. They had very much reason to congratulate themselves, not only on the increase in the number of members of the Association, but also on the work that was being done. Empirics and quacks were being weeded out as far as possible; and although the number of persons so dealt with had not been great as yet, and the moral effect of the prosecutions could not be comprehended at present, still he had no doubt that good results would be seen in the course of a few years.

Mr. ROGERS seconded the motion, which was unanimously carried.

The PRESIDENT: We have now to fix the place for the annual meeting in 1889. The matter has been before the Representative Board, and I think the Secretary will have something to tell us in this connection.

Mr. SMALE: An invitation has been sent to the Association from the Southern Counties Branch asking us to hold the annual

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meeting for 1889 at Brighton. This was before the Representative Board this morning, and they recommend that the invitation be accepted. It is also recommended that Mr. S. Lee Rymer (Croydon) be elected President for that year. As to the date of holding the meeting, two dates have been discussed—one, the 22nd, 23rd, and 24th of August, and the other the 29th, 30th. and 31st of the same month.

After some discussion the earlier dates were adopted.

Mr. DENNANT, as representing the Southern Counties Branch proposed Mr. Rymer as President for 1889. Anyone acquainted with the progress that had been made in dentistry knew what a strong force Mr. Rymer's name had been in connection with it for the last thirty years.

The motion was seconded by Mr. Browne-Mason, and unanimously agreed to.

Mr. SMALE said in reference to the alterations in the Representative Board, the five topmost names on the list of representatives for London retired, but two of them were recommended for re-election, namely, W. H. Coffin and A. J. Woodhouse.

For the provinces five names came off: and in addition Mr. T. E. King had become an ex-officio member of the Board, as President of the Midland Counties Branch. In the place of these gentlemen the Board recommended Messrs. J. Ackery, W. H. Coffin, J. Fairbank, W. Hern, and A. J. Woodhouse to fill up the vacancies on the London list. For the provinces: Messrs. J. A. Biggs, W. Campbell, J. H. Fothergill, B. Neale, J. H. Redman, and Theodore Stack were recommended. If any gentleman wished to propose any other member or members of the Association in the place of those recommended by the Representative Board now was the proper time for him to do so.

It was recommended by the Representative Board that the following alteration should be made in byelaw 7, viz., that the words Vice-Presidents be inserted after the words President-elect.

On the motion of Mr. BROWNE-MASON, seconded by Mr. DILCOCK of Liverpool, it was unanimously resolved that the recommendation of the Representative Board as to these names be adopted.

The PRESIDENT: We have now to receive reports from sub-committees on Dental Aspects of Public Health.

Mr. CUNNINGHAM read the following report:—

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The special committee appointed by the Representative Board to carry out the resolutions passed at the last Annual General Meeting, with regard to the "Dental Aspect of Public Health," beg to submit the following report:—

It was felt that in the event of the authorities seriously considering our proposals, we should be in a position to inform them as to the probable cost of any such public dental appointments we were prepared to recommend, and also what amount of professional service might be reasonably expected for such expenditure.

As the result of the examination of the mouths of the recruits entering the Army, we may take it that on the average each army recruit would require the following operations, to reinstate the efficiency of his dental armature:—Two extractions, four fillings, scaling, and gum treatment. As the carious cavities and the necessary operations will be, for the most part, simple, it is calculated that an experienced operator should perform these operations in about one and a half hours. Allowing 265 working days to the year, with an attendance of six hours a day, it is calculated that a surgeon dentist could attend efficiently to four men per diem, which would thus give an annual total of 1,060 mouths put in order. If, on admission to the ranks, the teeth of all army recruits were thus put in a state of efficiency, and proper attention was given to their being kept in a state of cleanliness, the subsequent dental treatment necessary to maintain that efficiency would not be very great, if periodical dental examinations were made. Probably the Army Surgeon-Dentist could efficiently attend to eight men per diem, giving an annual total of some 2,120 mouths per annum.

With regard to the Navy, we have not the same reliable data on which to base an opinion, but inasmuch as the naval recruit is younger, and the severity of the examination of the teeth is much greater, than in the Army Recruiting Department, the average attention per recruit would be less than in the case of the soldier. This view is borne out by an investigation of the work done at the Dental Hospital for the recruits sent by the London Naval Recruiting Department. A Naval Surgeon-Dentist, then, might be expected to make more recruits efficient, and maintain the efficiency of a greater number of sailors than his army confrère.

Marines and artificers as recruits would, however, be found to have mouths in a similar condition to that of the army recruit. The Committee will be glad to receive statistics of the amount of

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work done, with the time required, and cost of executing the same, from holders of dental appointments to hospitals, schools, &c.

The President of the Southern Counties Branch determined to take advantage of the fact of the last annual branch meeting being held in so important a military and naval centre as Portsmouth, to call attention to this important subject; he therefore invited one of the members of our Committee to move a resolution on the subject. The following resolution was therefore unanimously adopted—"That this Association is strongly of opinion that, in the interest of the State, some provision should be made for attention to the teeth of our soldiers and sailors, and that the special committee appointed by the British Dental Association for that purpose be encouraged to bring the matter urgently before the proper authorities.

The words in which Surgeon-Major Crowe, of the Army Medical Staff, seconded the resolution, are worthy of being specially noted, as, no doubt, it is good evidence that the apparent callousness, or indifference, of the administrative medical officers at head-quarters is not shared by all the executive officers of the Army Medical Department. He said that the question was one of great importance. He had served upwards of twenty years in the army, and his experience as a soldier fully supported the views of the mover of the resolution. Many a soldier was invalided owing to ill-health caused by defective teeth, and he considered that if the British Dental Association would bring such pressure to bear on the authorities as would induce them to give the soldier proper attention, the Association would prove a good friend to the soldier.

Abroad, particularly in the West Indies and India, soldiers suffered much from decayed teeth, and were practically without assistance. Medical officers in the army were not required to know anything about dentistry to qualify them for a commission, and as they got no training while in the service, the soldiers received no attention. The only dentistry he had seen in twenty years was the extraction of teeth; as to stopping teeth, he had never attempted it, and had never seen it attempted. He therefore seconded the resolution with pleasure.

After carefully considering the whole matter, both as it related to the army and the navy, the committee determined, in the first instance, to approach the naval authorities, which they accordingly did in the following memorial:—

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40, LEICESTER SQUARE, LONDON, W.C.
April 30th, 1888.

TO THE LORDS COMMISSIONERS OF THE ADMIRALTY, WHITEHALL.

MY LORDS,—At the last Annual General Meeting of the British Dental Association held in Glasgow, on the 19th August, 1887, resolutions were adopted to the effect that the members present were unanimously of opinion that the present provisions made by the Government for the supply of dental assistance to the men of the army and navy are inadequate.

The following resolution passed at the time bears more particularly on the object of this memorial :--

> "That considering the great advantage arising from the possession of sound teeth, especially in the case of men in the army and navy, the Representative Board should suggest to the Government the desirability of making suitable provision to that end."

In pursuance of these resolutions the Representative Board of the British Dental Association, appointed a sub-committee to consider the question, and to draw up a report, and after the adoption of that report they respectfully desire your lordships' favourable consideration of the subject as far as it applies to Her Majesty's Navy.

1. They are acquainted with your lordships' memorandum issued for the guidance of recruiting officers in the London district, by which the number of absent or defective teeth, which would disqualify a candidate, is extended from five to seven.

2. They have reason to believe that the arrangement entered into by your lordships, in December, 1885, with the authorities of the Dental Hospital of London has proved so far satisfactory.

3. They beg also to call your lordships' attention to the fact that neither in the present medical curriculum, nor in the course of special training at the Royal Hospital, Haslar, is there any provision made for efficient instruction in Dental Surgery, and that more than an elementary acquaintance with the subject is necessary in order to advise your lordships to the best effect as to how far dental surgery may be able to assist in promoting the efficiency of the navy.

They therefore respectfully beg your lordships to allow a dental practitioner, selected by them and approved by your lordships, to examine the recruits passing through the London Recruiting Depôt, to collect statistics as to the condition of their teeth, and to report to your lordships thereon, in the hope that his observation may be of use in increasing the number of recruits available for the service, and thus promoting the efficiency of the Royal Navy and the Royal Marines.

Herewith we beg to enclose copies of the publications of this Association, bearing on this subject, and to state our readiness to appoint

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a deputation to wait upon your lordships, in the event of your desiring further information, before acceding to our proposal.

We have the honour to be, my lords,
Your humble and obedient servants,

ENCLOSURES :—" Dentistry and its Relation to the State," by George Cunningham, B.A. (Cantab.), L.D.S.Eng., D.M.D.Harvard.

" Compulsory attention to the Teeth of School Children (the Army and Navy)," by W. Macpherson Fisher, L.D.S.Eng.

" Compulsory attention to the Teeth of School Children," by W. Macpherson Fisher, L.D.S.Eng.

" The Dental Aspect of Public Health," by George Cunningham, B.A. (Cantab.) L.D.S.Eng., D.M.D.Harvard.

In response to which the committee received the following reply :—

M.D., 88/20/5. ADMIRALTY, *23rd May*, 1888.

SIR,—I am commanded by my Lords Commissioners of the Admiralty, to acknowledge the receipt of your memorial (with enclosures) dated the 30th ultimo, requesting permission for a dental practitioner to examine the recruits passing through the London Depôt, and, in reply, I am to acquaint you, for the information of the Representative Board of the British Dental Association, that their lordships are advised that no benefit would accrue to the recruiting of men and boys for the Navy by the adoption of this proposal ; and that the arrangements at present in force provide for all the requirements in the matter.

I am, Sir, your obedient servant,
EGAN MACGREGOR.

MORTON SMALE, Esq., *Hon. Sec. B.D.A.*,
40, Leicester Square.

The Committee having duly considered that reply, are of opinion that before proceeding further in the matter some direct personal influence must be brought to bear before it endeavours to obtain a reconsideration of the memorial.

The Committee are desirous of calling prominent attention to the fact that the request of the memorial was of the most modest description since it contained no substantive proposition, but merely asked the means of confirming the information which we already possess, although not to such degree and in such detail as we consider necessary. It is also worthy of record that this proposition for facilities to report would not have involved the authorities in any expense, and therefore this refusal is all the more incomprehensible.

The Committee think it desirable also to call prominent atten-

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tion to the fact that whereas during the year 1886 forty-nine men and boys were treated under the Admiralty contract with the London Dental Hospital during the first seven months of the current year the number has increased to over ninety. Such facts speak for themselves, and seem to show that the position of the Lords of the Admiralty on this question is, to put it mildly, an erroneous one, and very unsatisfactory.

The Committee feel, therefore, that they must appeal to the individual members of the Association to use their personal influence to promote in every way some expression of public opinion on so important a public subject.

It is extremely desirable, therefore, that since this question is one of public rather than professional concern, efforts should be made to induce the Press to take up the question and thus give it the prominence which is essential to its recognition.

The Committee have had also under discussion the question of attention to the teeth of school children, and as the subject is one of such great importance they have requested Mr. Fisher, of Dundee, to make a special report on the subject.

Mr. Fisher, of Dundee, submitted the following report:—

It is the desire of the sub-committee appointed on this subject that the Branches of the Association should tabulate the conditions of, and the amount of decay in the teeth of the school-children in such schools as the parochial or workhouse; the industrial, which also embraces the training-ships and reformatories, and the orphan schools. These would be sufficient schools to commence with, though I think, where it is possible, the children in Army and Naval Schools might also be embraced in the foregoing.

The object of this tabulation would be for the Association to lay before the directors of these schools the unsatisfactory conditions of the teeth of the children under their care. If this dental neglect was then to continue—in the case of parochial and industrial schools—the Association might possibly have a grievance some day to bring before the Local Government Board and the Home Office, who spend so much money on these schools respectively.

To obtain this tabulation the Association must provide books of similar pattern for the branches. I would therefore ask that this Annual Meeting sanction the expenditure by the executive of £10 for the printing and circulating of case-books to the branches.

Mr. Fisher thereafter drew attention to the need of lessons in

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school-books on the care of the teeth, and thought that the Association might endeavour, either through the educational commissioners or publishers, to attain their ends. At the Congresses of the Sanitary Institute of Great Britain he also thought it would be desirable if some of our members would read papers on the necessity of mouth hygeia.

Mr. FISHER added that the meeting would have to say whether they would sanction the expenditure referred to in the report for books to be sent to the branches. Again, they were badly in need of members who would volunteer to read papers at the annual congresses which were held round the country.

The proposition with reference to the grant of £10 having been seconded, was carried by acclamation.

The reports of Mr. Cunningham and Mr. Fisher were formally received.

Mr. SMITH-TURNER said they had a large amount of business to get through, and first of all they had to record their thanks to the Corporations and individuals who had made their visit to Dublin possible. He had, therefore, to move that the thanks of the Association be given to the Provost and Senior Fellows of Trinity College, Dublin, to the President and Council of the Royal College of Surgeons in Ireland, to the Chancellor and Standing Committee of the Irish University—he believed some of the representatives of these Corporations were present, and he hoped they would convey to their associates the cordial way in which the Association had received the mention of their names: and to the Earl of Howth for the use of his pavilion for the excursion on Saturday. They had also to record their thanks to Mr. Booth-Pearsall, to Dr. Baker, and the Museum Committee, to Dr. Stack and Dr. Hazleton and to the demonstrators and readers of papers. The work of these gentlemen spoke for itself, and he could only say that he had much pleasure in proposing a formal expression of the thanks of the Association to each of the individuals and Corporations named.

Mr. KING seconded the motion, which was carried.

The Rev. Dr. HAUGHTON having briefly responded on behalf of Trinity College, and Dr. RAWDON MACNAMARA on behalf of the College of Surgeons,

Mr. BROWNLIE then delivered the following valedictory address:—

We have now all but completed another year of the British

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Dental Association. The books have been closed, the balance has been struck, and the report is in your hands. A critical investigation may shew that there are items to both the profit and the loss side of the account, but your acceptance of the report decrees the fixedness of the result. The period for effort is over, and it only remains for me now formally to hand over to the successor you have appointed, the honourable office with which you invested me a year ago. With him begins another year, my connection is with the year that is past.

Without doubt one steps down from such a pedestal with very mixed feelings. Looking back may be fraught with some degree of satisfaction, but the past too often includes matter for unavailing regrets. There is the inevitable feeling of what "might have been," as compared with what "has been." There is the experience which has been gained, only to be stored away, for possible use in the far distant future. But there is a feeling of relief too, in thus escaping from harness. Some degree of responsibility is removed, though I am far from disposed to speak of this office, as in any sense a burden. Its duties may be said to be measured by the holder's interest in the Association and his disposition to help forward its work. All that a president can do he may do, in the way of promoting its interests, but as "kings can do no wrong" no more can he. The president of such an association is not long in realizing that the poet's boast on behalf of the river, applies equally to the British Dental Association, and its chief offices; It too can say that

> "Men may come and men may go,
> But I go on for ever."

The office is permanent, the officer has but time to realize his position, ere it becomes the possession of his successor.

Still, it would be difficult to imagine that promotion to such a prominence in the Association did not give rise to a more than usual interest in its affairs on the part of the nominee. What president could fail to experience as lively an interest in the events of his year, as if he himself were responsible for them, or what member of this Association named for the office could look forward to his term without experiencing the desire that his year should include some notable event, some prominent landmark in the history of the British Dental Association? Only the smallest modicum of satisfaction could be extracted from being able to

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hand over his charge to his successor with nothing written off in name of depreciation or bad debts.

Whatever estimate we may severally have formed of the past year's proceedings, it will generally be conceded that it has been a markedly progressive one. We have had our troubles, but they cannot be said to have exceeded the average. The Hon. Secretary has told of the work accomplished, and for the amount of movement the friction has not been excessive. With new machinery bearings may get a little heated, and although we may have had to notice a rise of temperature here or there, the increase cannot be said to have exceeded the degree compatible with a state of vigorous exercise. Nothing certainly to interfere with the due discharge of its duties, or to prevent the British Dental Association taking deeper root and spreading its branches further into the length and breadth of the land.

To the passing year belongs something of an historic interest. It has witnessed a new departure in the development of this Association. For the first time in its history we have met upon Irish soil, and on the invitation of an Irish Branch to hold our annual meeting.

I can claim no active part in the formation of this the latest addition to the number of Branches, but I shall carry away with me, as the happiest memory of my tenure of office, that it fell to my lot to preside over this first gathering of the British Dental Association called together on Irish soil; the first, and—we will hope—the beginning of many happy re-unions by which the importance, the influence and the resources of the British Dental Association cannot fail to be greatly augmented—no longer in name only but in very deed the British Dental Association. Unlike the wise men in "another place," *we* have solved our Irish question, and Ireland no longer blocks the way. Indeed, our Irish brethren have taken this matter up with such characteristic enthusiasm that they make us to doubt whether they or we are the better pleased at the consummation of so desirable result: that community of interests and aspiration has at length been recognised, and that we have agreed to work in harmony for the accomplishment of those ends, which our knowledge of the subject shews us to be for the best interests of the profession and of the public. Certain it is that the welcome which our Irish brethren have prepared for us, and the arrangements entered into for the furtherance of the work of the Association, cannot but inspire the very happiest anticipations from the formation of an

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Irish Branch, which is so happily representative of unity, nationality and progress.

Within its first decade the British Dental Association has now formally entered upon and occupied the whole of the home territory; and unless the hint of a year ago is to bear fruit, and we are to become enriched with Colonial possessions, we must now recognise that progress by way of territorial aggrandisement is over. That our base of operations has now reached its limit, and attention must be directed rather to the full development of the resources we now possess. We have attained to representation in the three divisions of the Kingdom, and it remains for the British Dental Association to make good its claims to the position it seeks to occupy, and the influence it hopes to exert in other directions; in the discharge of functions which are capable of affording ample scope for all its energies.

To have attained to representation all over the country, is indeed a fit subject for congratulation. Without such a base of operations this Association could but advance a partial and imperfect title. It would be still more satisfactory if we could, without exaggeration, claim to be advancing in another direction—a direction in which it is very desirable we should be making progress. A progress backward, some might say, but capable, nevertheless, of adding materially to the position of the Association. May we not look upon some later additions to the roll of members as suggestive of a more generous—or rather a more just review of the situation, giving rise to feelings akin to repentance, and a disposition to amend and do better in the future? Surely it would augur well for this Association, during its next decade, if the men whose names we had reason to expect to find, but looked for in vain, in the original list of members, thoughtful, prudent, and sufficiently disinterested members of the profession, are awaking to the importance of the movement, and to their duty in regard to it. That they can no longer rest content to be mere spectators, and are coming forward to lend their aid in the establishment of order and good government. Would that it were so, and that the number was greater. But there are still estimable members of our profession, men capable of doing credit to it, and who are training up sons to follow in their footsteps--doing all they can to make them better practitioners than they themselves have been, sparing no outlay upon education and special training, that these sons may be efficient in every department of their calling. Doing everything within their power on behalf of the individual, and just

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nothing at all on behalf of the profession to which they belong and of which he has made choice. They are like men greatly interested in the quality and the quantity of the cargo with which the ship is being loaded, yet giving no heed to what should be the first consideration—the seaworthiness of the ship itself. Nay, they may be described as loading with the knowledge of serious defects in the vessel's composition. Such members of the profession appear to be leaving to these sons and successors, to continue a struggle—which a little effort on their part might lessen or render unnecessary—and to win social position apart from their calling; unless, indeed, others should see fit, and prove competent to stem the tide.

What proportion of the names on the Dental Register ought also to appear on the roll of members of the British Dental Association we can but guess at from our own knowledge of the *material* in question. We are not ambitious of equalling that too bulky list. We don't want them all. We are better without a very great many of them, for we have to deplore that this Register which was designed for a much better purpose, should have been marred in the very beginning by so much inaccuracy and misrepresentation. That an instrument intended to be a trustworthy guide should have been by extraneous influence converted into a means of setting forth fraudulent claims and of creating the new distinction for the charlatan of "registered dentist." Such things are disappointing, but they are not fatal. We can afford to give them due weight, for the account has been more than balanced by the substantial gains of the last ten years. We need not yet be counting our gains, it is too soon; but it is equally premature to be growing impatient of results. Doubtless the work would have been better done and more complete had our ranks been filled up as they should have been by those still standing aloof, those who require to be told that their present attitude is not merely a loss to the cause of the British Dental Association, but a distinct gain to the enemy; reputable practitioners, who are not also members of this Association, must form the very backbone of the forces with which we have to contend. Whether they mean it or not, without the support which their present attitude affords to the opposition our work would be easier. The Dentists' Register has not proved the fortress we thought to raise, but here is a citadel which we may render impregnable, here is a Register of which we have the absolute control, resting not upon a legal view of the scope and in-

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terpretation of an Act of Parliament, but founded upon the estimation in which his fellows hold each man's claim to belong to the dental profession. We can but invite and urge upon all who are interested to make use of it. We know that it could not quite take the place of the other, but it would serve to draw a hard and fast line of demarcation between those who are and those who are not of the dental profession. It would materially add to the power of the executive to cope with its difficulties, and it would provide a lever which the friends of the profession would know how to use as occasion might serve.

The British Dental Association has never, that I know of, been described as exclusive or over-exacting in respect of its admission of members. Some may say that its doors are rather too wide open to please them; that under more stringent regulations they might have seen their way to take part in it. Well, it may be so, but the certainty of it would not now lead to change in this direction, and we may commend it to the serious consideration of all such that there may be danger in seeking to wait for—in refusing to move without—the improbable. They seek to remain indifferent, or they think still to keep neutral, but it seems to me that the period is approaching when the profession will be divisible into two main sections; a time when a respectable neutrality will become harder and harder to maintain, and the man who does not choose to associate with his fellows, may have to be content to be classed with men so bankrupt in *status* and reputation as to be unfit for the membership of an Association whose very vitality is dependent upon the largest possible membership.

For its future we may well predict for the British Dental Association much greater things than we have seen in its past. An association which is concerned with all its interests—its politics, its science, its social relations—must grow with the growth of the profession which has called it into existence. While our art continues to commend itself to suffering humanity—while it continues to add to its resources, and develop its powers—the necessity for such an association will continue to grow. The progress of the Association will be most apparent in the growing length of the roll of its members. Its progress will be most real in the increasing number of its Branches. The test of time is being applied to its fitness to cope with the work it has undertaken, and it begins to be evident that its power for good will be in proportion to the number as well as the efficiency of its Branches. Do we quite

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realise that Branches are not—need not be—mere echoes of the parent society? That they have functions to perform, and opportunities for work, which the parent society cannot exercise, and does not possess? This is not a case in which numerical strength and efficiency go hand in hand. Weeds grow apace, and the most close and constant supervision is wanted to keep them down. For such work we want Branches—more Branches; strong Branches if we can, but many—and many rather than strong. Huge districts may mean—probably do mean—less perfect supervision; and how, for instance, is the purity, the rescue of the Dentists' Register to be attained, unless such work be thoroughly well done? Let our Branches be fully awake to the importance of their trust, to the extent of their opportunity. Let the districts be kept within workable limits, that local officials be not burdened. Let Branch officials understand that they are expected to be able to give an account of the pretensions of everyone claiming to practise our art in their respective districts. Then will the British Dental Association more fully grasp the situation, and be more adequately prepared to encounter those powers for evil against which it seeks to make a stand. Let us look to perfect our arrangements. The work to be done requires attention, and efficient organisation. It will require some effort, but if we will, the issue need never be in doubt.

A vote of thanks to the outgoing President having been proposed by Mr. CLARKE, seconded by Dr. HAZELTON, and carried by acclamation, Mr. BROWNLIE briefly replied.

The minutes were then read and confirmed.

The President, DANIEL CORBETT, M.R.C.S., L.D.S.Eng., then took the chair amid applause, and delivered the following address:—

The first duty I have to discharge is, to me, a most agreeable one; it is to thank on the part of the Irish Branch of the British Dental Association, those numerous friends who, at considerable inconvenience, have come to honour us with their presence here to-day.

My native language enables me to compress into one phrase a volume of utterances, and, with all sincerity I use it, when I bid you all a "caed mille failthe."

Before entering more directly on the subjects personal to myself, as regards the observations I am expected to make at this meeting, I feel I should be guilty of a sad dereliction of duty were I to omit

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this opportunity of calling your attention to the museum we have arranged for you; its volume and variety must suggest the amount of trouble spent in the collection and classification of the different articles comprising it. With this labour and its highly successful result, I must couple the names of Wm. Pearsall, Theodore Stack, and Arthur Baker, to whose untiring industry and indefatigable exertions, we must attribute the interesting collection this day provided for your intellectual repast.

The monitor of my existence reminds me the time is near at hand, when I must resign the active duties of professional life, and seek in quiet and repose the necessary preparation to surrender to that Wise Dispenser of all good, those talents and abilities He has confided to my trust, in order that I might, with His assistance, develop them to His greater honour and glory.

When with me "Life's fitful fever shall have ended, and I have shuffled off this mortal coil," the year 1888 will still be memorable amongst the archives of our profession, as that in which the British Dental Association held its first meeting in Ireland under the presidency of an Irishman who, at the same time, occupied the presidential chair of the Odontological Society of Great Britain.

Gentlemen, I should be more than human, were I not proud of the position I now occupy amongst you, when I recall the names of those who in the past have held high positions in our profession, viz., Tomes, Saunders, Cartwright, Parkinson, and other professional celebrities well known to you all. I must not, however, allow my pride to master my gratitude to my professional brethren, through whose instrumentality I have been placed in my present exalted position; if I except my long professional life, I look in vain for evidences of such merit as should justify their selection of me as their president. When deliberating as to what should be the nature and tone of my address to you on this important occasion, it occurred to me that a brief retrospect of my early professional career might not be altogether devoid of interest, and a concise narrative of the many difficulties I had to contend with and overcome, prove to the younger members of our Association an incentive to vigorous action on their part in the pursuit of knowledge, and illustrate more forcibly the progress our profession has made in the present century.

Gentlemen, as the son of a self-educated dentist, I this day appear before you. "Fair Science frowned not on my humble birth," but necessity, that exacting mistress, stimulated my father's

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efforts to acquire the knowledge of a profession, called such at that time through courtesy, and but little understood by those who practised it.

Gentlemen, you see to-day on every side the evidence of refined scientific investigation, skilled manual and digital dexterity and mechanical contrivances of no ordinary merit. Allow your imagination to travel back sixty years, when hot water as a means of softening the wax used for taking the impression of the mouth was not known, or the tray for holding same when ready for use, the coloring of the model, as a means of assisting the efforts to let down a block of bone cut from the tusk of the hippopotamus, out of which an imitation of teeth was to be carved, and you will form some idea of the means of instruction at my disposal when I commenced my professional education. Well do I remember the laborious toil associated in those days with the construction of a set of artificial teeth, the time consumed and the very defective result. Six weeks was the usual time spent in the manufacture of a complete denture when working bone and natural teeth; each tooth was drilled through the pulp chamber, a silver top screwed into it of required length and rivetted, in the ordeal often split, consequent upon the dryness of the tooth. I should observe, before the use of *human* teeth became general, it was customary to use extensively the hippopotamus tusk, sections were cut to suit the required curve, the enamel carefully *preserved*, and so cut as to insure a front aspect of enamel on the tooth carved.

In our museum you will see illustrations of the style of work I allude to. When human teeth were in fashion, our supply was usually had from the graveyard, and I recollect what attention was paid the grave digger, at his periodical visits to my father's residence, with his gleanings from the coffins, he chanced to expose in the discharge of his avocation. His visits were generally at night, and no hospitable duty in which my father might chance to be engaged was permitted to interfere with the reception of this ever welcome visitor into the *sanctum sanctorum* of the house.

The introduction of the gold plate as a means for mounting artificial teeth dates from the commencement of the present century, my earliest recollection of it being associated with the additional labour thereby imposed on the mechanic. The assistance of the brassfounder was now availed of as a necessity, and I am disposed to laugh when I recall the preliminary actio

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before his services were brought into play. The model of the mouth being taken in wax, the impression of the *teeth* was filled with cotton wool, only leaving a shallow indication of their locality, the plaster was cast, and when fit to draw the under surface was carefully cut flat, all overhanging edges of plaster removed, and the model placed on a flat iron plate heated over the ordinary house fire; when the warmth of the plaster indicated the proper time, the attempt was made to draw the plaster from the wax mould so as to preserve it, the latter for a second cast giving the true length and position of the teeth to serve as a direction in the finishing stage. The first cast was carefully prepared, all extra plaster removed and consigned to the brassfounder, who supplied at his convenience a facsimile in metal. In these days we could not cut a pattern in sheet lead and get the gold plate flatted and in size suitable to our requirements, then the would-be mechanical dentist must melt alloy and roll his gold plate, and a laborious and perplexing duty it often proved to be in our efforts to contend with what metallurgists will understand as unaccountable brittleness, necessitating the repeated melting of the metal until the requisite ductility was obtained, this fact being proved when the ingot was rolled out to the required size. At this time natural teeth were generally in use and attached to the frame by means of a top screwed into the tooth and rivetted at the obverse side of the plate.

In 1825 composition teeth, called at the time "Teno Metalic" were introduced to public notice, and with this novelty, increased labour to the dental mechanic; the idea of soldering a piece of porcelain to a gold plate seemed a doubtful matter. To Mons. Andebrau, of Paris, we are indebted for the invention. You will find some of the earliest specimens of this manufacture in the museum, the particular construction of the teeth will at once suggest the manner of attaching them to the gold plate, but you cannot understand with what care and anxiety as to the result, the operation was attended, the soldering was done with the ordinary blowpipe, each tooth twice heated to redness before its final attachment to the plate, ordinary binding wire being used to fix the tooth in the required position; now, fancy, if you can, the full number eight in position and ready for the last soldering, the gradual heating of the entire piece, in order to avoid the accidental cracking of one or more of the teeth, and the physical distress accompanying the necessary effort to maintain a continual

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blast, and you will understand one of the many labours imposed on the mechanical dentist of the time. Gas was not used as the soldering flame in those days, cotton wick, yarn and grease in the open cresset made up the soldering lamp, and many a distressing half hour I spent over it. When a very tough piece of gold plate was required, the metal was melted on a piece of charcoal with the blowpipe, and when in a molten state, cooled with the face of a hammer and then rolled. I have often melted one ounce of gold in this way, and if I succeeded in getting a tough ingot, I assure you I found it a tough job.

In 1829, my father went to Paris to learn the process of manufacture of the "teno metalic" teeth as invented by Mons. Andebrau, and after the required sojourn in that capital, returned to his native city, Cork, with the necessary information as to the materials used and the *modus operandi* of their construction, and I am proud to think with the introduction of those now highly prized and indispensible articles into this country, the name of Corbett will ever be associated.

For some years we laboured at the manufacture of the flat teeth with the usual uncertainty, meeting disappointments when least expected, but satisfactory results at times encouraged us to persevere farther in our efforts to produce a perfect article. In the year 1832 a Mr. Hallit called upon my father for the purpose of introducing to his notice a new form of mineral tooth, solid, of the natural shape, and having a tube in it to carry a pivot in lieu of the soldering platina points, which characterised the French pattern tooth. As the specimens he exhibited were a decided improvement on the mineral teeth then in use, my father readily accepted Hallit's terms for the necessary instruction in their manufacture. A suitable furnace was built in the only available room in the house, that in which my brother and myself slept, and forthwith we commenced our new manufacture, with varying success, occasional disappointments, but the results sufficient to reward our labours, until consequent upon the great heat used, we split the wall of the house to the very top. I regret more than I can express that I am unable to show you some of those same teeth, but I can a drawing of the furnace used in firing them and the receipt of the different ingredients entering into their composition, all in my father's handwriting, and given to me in the November of 1835, when I paid my first visit to this city (Dublin) as a medical student.

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Gentlemen, you see in our museum those beautiful specimens of mineral teeth, manufactured by Messrs. Ash & Sons, they are the outcome of information given to that firm by my brother, in 1837, when he made and baked for them in a brassfounder's Hessian crucible, the first tooth they ever made, and in the summer of the same year he built for Messrs. Lemale & Co., of Charles Street, the facsimile furnace to that we used in Cork.

Gentlemen, as a representative of the old school of mechanical dentists, I am disposed to indulge in a little vanity when I recall all we were able to do, and the style of work executed in those days when we had *no* assistance, and witness the present state of things, when the mechanical dentist has everything done for him to make things easy. To indulge in a little poetic exaggeration, I am inclined to compare the one to the labours of Hercules, and the other to that of Paris, when given as a task, the allocation of the *Pomum Discordiae.* In our meeting here to-day we have a threefold object to attain; we are here to thaw that rigid formality, jealousy, and reserve which hitherto has kept us estranged from each other, and "froze the genial current of the soul." We are here to eradicate that noxious weed of empiricism and humbug which still grows rank, and "rots itself at ease" in our very midst, and we are here to sow that seed which will vegetate, fructify, and grow into a tree, from the branches of which we will suspend the lamp of scientific knowledge and persevering research, which like unto that Promethian fire the Persians burn in the mountains, will flame night and day, never to be extinguished; it will illuminate our individual onward paths to eminence and celebrity, and direct a discerning public in their search for cultured professional service.

Gentlemen, our committee have allotted space to exhibitors and time to speakers, so I must not exceed the limit of my privilege. In the observations I have made I was influenced by a desire to amuse rather than to edify or instruct, of the measure of my success you must be the arbiters, as such I await your verdict—be merciful in your criticism, and may I not hope to hear it in the language of Mercutio when describing his wound, "'Tis not so deep as a well, nor so wide as a church door, but 'tis enough, 'twill serve."

A vote of thanks to the new President was proposed by Dr. Smith of Edinburgh, seconded by Mr. Smith Turner, and carried by acclamation.

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After luncheon at 2.30 p.m., Professor George F. Fitzgerald, F.T.C.D., conducted the lady visitors of the Association over Trinity College and its many interesting buildings.

After luncheon on Thursday the reading and discussion of papers was proceeded with in the Anatomy theatre.

Dental Ethics.

By THEODORE STACK, M.D.Dub., F.R.C.S.I.

As the subject of dental ethics has been selected for me by my zealous and energetic friend, the Honorary Secretary of the Irish Branch, and as I share with him the view that the definition, by the Association at large, of an ethical code is a matter now ripe for settlement, I have undertaken to introduce this subject.

I find, however, that the topics of which it must necessarily treat are many and various. Conscious that while my paper has reached an inordinate length, I have failed to do much more than enter the threshold of this subject, I would ask, on account both of the length of my paper, its incompleteness, and its want of condensation to read a semi-abstract, and to be permitted to suggest to the members present that it is advisable that any discussion which may arise on the subject, may as far as is possible be limited to the question, "Is it advisable, or is it not, that an ethical code should be established?"

If speakers take up each detail to-day, the discussion on these would be interminable.

With regard to the relation of the dentist to the public: as long as the term dentist signified an unknown quantity, it was impossible to lay down any general code of relation between him and the public.

Previous to 1859 there was, as far as dentists were concerned, general chaos. About that time Sir J. Tomes (whose absence to-day we so much deplore, while we feel confident he is with us in

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spirit), in conjunction with other pillars of the profession, succeeded in inducing the English College of Surgeons to establish a diploma. The chief principle laid down by Sir John Tomes, was that the education of the dentist required a peculiar combination of mechanical and surgical training, and that this combination was not to be found in the curriculum laid down for the general surgical diploma.

The spirit of this movement culminated in the Dentists Act of 1878. This Act has done much to convert the term dentist from an unknown to a known quantity. Dentists, since the passing of this Act, are bound as far as they can and have opportunity, to assist in the training of a proper supply of dentists to meet the requirements of the public. Their attitude should now be to encourage young men to enter this profession as an honourable calling.

The dentist should recognise the duty of being particularly forbearing and tender with young children, and endeavour to train up the new generation to believe that a visit to the dentist will not entail pain. He should maintain the dignity of an educated gentleman; as far as possible be regular and punctual with his engagements, and considerate of the time of his clients. He should be courteous, firm, humane, cool, steady, temperate, and genial.

The public having passed the Act of 1878 should, in their own interest, contribute to support dental hospitals, at least in all large centres. They should treat the dentist as an educated gentleman; recognise that he has expended a large amount of capital on his education, and that his opinion and his work should receive fair and cheerful remuneration.

Medical men should be trained as students for a large part of their curriculum on the same benches with the dentist. As a result of this the seeds of mutual respect and appreciation would be sown. This would be a sure remedy for those despicable and unworthy feelings of jealousy, wounded dignity and contempt, which bring alike discredit and disgrace on those who give them expression.

The question of the fees charged to medical men should be discussed. It is immoral to do gratuitous work for the medical man in the hope that he may send the dentist patients.

The relations of dentist and doctor about anæsthetics should be temperately discussed and defined.

The line of demarcation between oral and dental surgery should

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be discussed; also the relations of dentists to each other; the question of advertisements; the question of consultation between brother practitioners; the question of scale of fees; the relations between the older and younger dentists.

Dentists calling on brother practitioners should not be detained. It is a piece of vulgarity and stupid affectation to keep a brother dentist waiting with the object of impressing him with the number of *your* appointments, &c.

Where two dentists arrange consultation punctuality is *incumbent* on both sides.

Dentists should embrace all reasonable opportunity of meeting one another in professional meetings and gatherings.

Gentlemen of the Irish Branch, with reference to this matter I appeal particularly to you. Would you, after having tasted the pleasure of professional intercourse, revert to the old policy of self-glorification and exclusiveness? Does not the feeling of mutual support, appreciation, and countenance, contrast favourably with that of suspicion, estrangement, coldness, or absolute hostility? Is not the better part of our nature made to bloom in the sunshine of our cordial professional intercourse, and are not the tares of backbiting, slandering, and all uncharitableness, in the fair way to be eradicated by the careful culture of our better social and professional relations? It would be utopian to expect that we should all become bosom friends, but it is not utopian to expect that these pleasant professional amenities should be the outward mark of an inward radical change in our feelings towards each other—feelings of mutual esteem and charitable regard. If our hearts are right in this matter, there will be little difficulty in arranging the details of definite ethical rules, and I may be allowed to say, Sir, in conclusion, that among the many efforts to support you in your year of office, you will favourably regard this as worthy of a place, and that this paper may possibly bear comparison to that glass rod, itself valueless, which, when introduced into the saturated solution, may cause the ripening thoughts of this Association to crystallise into the definite form of a detailed ethical code.

Mr. W. Booth-Pearsall (Dublin) said it would be of the greatest possible service to their profession, if their Representative Board would tabulate a code of ethics. They were not all born with the same advantages, and when men in their eagerness

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or selfishness forgot those little amenities which made life run so smoothly, professional relations were apt to become strained. The question should be considered in its broadest aspect, and a code tabulated which would last for years. Some years ago the Shropshire Branch of the British Medical Association tabulated a code of ethics by which many a dispute was afterwards settled. In the Army and the Navy, where etiquette reached its extreme development, everybody knew what he was bound to do towards his colonel, his major, his captain or his lieutenant; and the result was that official courtesy was carried out with the greatest precision. He did not see why the same precision should not be characteristic of their members. He trusted that this paper would not be left in a pigeon hole to moulder, but that a report upon it would be presented at the next annual meeting.

Mr. J. Smith Turner (London), said that the question of dental ethics was rather an intangible one. They might talk about it, but it seemed to elude their grasp, and it was very difficult to convey anything definite on the subject. He had an opportunity some time ago of addressing an assembly of students at a prize giving in London, at which he had been invited by Mr. Smale, to distribute the prizes; and in his remarks he strongly advocated classical education. Education might be extended in scientific directions, and physical science, anatomy, physiology, and other things taught, but unless it was also calculated to refine men's modes of thought, and their relationship to each other and to their patients, it would be far away from the mark of an educated gentleman. He believed that this kind of education was alone to be found in the classics. It was an axiom commonly received that when they made laws they made offences, and that the greater the number of the laws the greater would be the number of offenders. There was this difficulty about any code of ethics, that it would need to be interpreted. No matter how cunningly and speciously devised the code might be it would always receive an interpretation according to the character of the individual who read it, and unless that individual possessed the mental characteristics to which he had referred, he was afraid that the code would not prove very efficient.

Mr. McClean (Dublin), said that in many of Dr. Stack's statements he heartily concurred. There were one or two points, however, on which he thought there was room for difference of opinion. Instead of having a report on the subject at the next annual meeting

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he thought the better way to ventilate it would be by discussing it in the pages of the Association Journal. In that way they could get the opinions of different members and different branches. The question of giving gratuitous services to the members of the medical profession in the hope of obtaining custom was one that would give rise to discussion. It was done by several men; and he considered the motive an extremely immoral one. It would be satisfactory to have some rule on the subject. The subject of the administration of anæsthetics might also be discussed in the pages of the Journal.

Mr. Blandy (Nottingham), did not think it possible to discuss this subject by pouring letters in upon the poor editor of the Journal.

Mr. George Cunningham (Cambridge) said there was no point of more interest to the members generally than the question of fees. He concurred with Mr. Blandy that the editor of the Journal would never be able to find room for a discussion by letters of the subject now before the meeting. It would be much better for the branch societies to take it up and report definitely on it; and in that way they might be able to find out whether any code of rules was desirable or not. But of one thing he was certain, namely, that a discussion of the subject would do much to improve the condition of the profession, both as regarded their relations to the medical profession and to their patients.

The meeting then adjourned for lunch.

Anæsthesia.

By Dr. ANTHONY H. CORLEY.

Mr. President and Gentlemen,—This time last year it was my privilege, as President of our Royal College of Surgeons, to assist in furthering the objects of your Association, and since then, with the aid of my colleagues, to add my humble efforts in endeavouring to make this meeting a success. My old friend, the indefatigable secretary of the Irish Branch, Mr. Pearsall, informed me that I would be granted an opportunity of bringing forward a

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paper on a subject which he and I have discussed frequently and earnestly. The title of my paper is "Anæsthesia in Dental Surgery," but as dental surgery is only a branch of our whole science and art, it is plain that observations on anæsthesia in this department must be treated, from not only a special, but a general point of view. The special bearings are few, but important; the general lessons are both numerous and far-reaching.

My own observations, although dating back to the time at which I joined the ranks of medical students, I shall confine to the last twenty-one years, the time during which I have been connected with hospital surgery. Since anæsthesia has reached the age of over two score years, it is plain that my practical acquaintance with the subject coincides with the period extending from the termination of its minority to the present time, which may be fairly termed its maturity.

My own experience has been fairly large, both in its general and its special application, but the more I know, the more I desire to know.

As anæsthesia originated in surgical dentistry, and its use has been therein as general as in systematic surgery, I was of opinion that a discussion upon it here would elicit valuable information. I considered that the views of educated and scientific surgeon-dentists, like the members of this Association, would be of deep interest to every branch of surgery and medicine in which this greatest of God's earthly boons is necessary.

I shall dwell particularly on three aspects of the subject: first, the choice of anæsthetics; second, the methods and appliances for their use; and third, the dangers, and the precautions necessary for the avoidance of these.

In order to be brief, I shall only deal with chloroform, ether and laughing-gas. My earliest lessons and experiences were altogether confined to the first. I adopted the second when thoroughly convinced that less danger attended its use. My knowledge of the third is confined altogether to its employment in dental surgery, in which, in co-operation with my friends Messrs. Stack and Pearsall, I have had many opportunities of using and making observations upon it.

With reference to both chloroform and ether, larger experience has given more comprehensive knowledge and greater confidence. The use of anæsthetics is yearly becoming more frequent and universal, and I venture to say the record of casualties has, not-

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withstanding their still alarmingly constant occurrence, a steadily decreasing ratio.

This must not be taken as even an approach to an argument for their indiscriminate use. I have already stated that experience and skill have been the result of increased knowledge, and without these the decreasing ratio could not result.

There is a certain margin of not-to-be-foreseen accidents which surround the use of all anæsthetics, but this is equally true of every surgical procedure. The ligature of a hæmorrhoid, the opening of an abscess, the extraction of a tooth—each of these has been followed by fatal consequences; but such possibilities have never more effect, when we recommend these operations or perform them, than that of making us most careful in our investigation of the general constitution and local conditions of the patients.

With reference to the immediate cause of fatal results in anæsthesia, it is necessary here to digress a little, in order that precautions and treatment may be rationally considered.

There is little reason to doubt that cardiac syncope, or sudden failure of the heart's action, is the primary cause of death by chloroform. Of course this arrest secondarily and immediately affects the brain and lungs, the two other members of what has been aptly termed the tripod of life; but the primary organ engaged is that which demands our attention as to its condition before administering the chloroform, our watchful care during the procedure, and to which stimulation should be directed should any untoward symptoms become manifest. Unfortunately, the cessation is sometimes so sudden and so complete that every effort fails, and thus the necessity for knowing its antecedent condition, and unceasing watchfulness during the anæsthesia. Some varieties of chloroform syncope, especially with weak hearts or where much hæmorrhage has occurred, are like the ordinary forms of fainting, where brain and heart re-act on each other—deficient blood-supply of the one producing defective innervation of the other. These are the cases where partial or complete inversion of the patient sets the failing organ in motion again. This necessity for almost coincident stimulation of both organs rationally accounts for the preference of modern surgeons for nitrate of amyl over electricity, a preference further supported by the want of evidence in favour of the latter. Does not this feint and mutual interdependence of brain supply and heart's ac-

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tivity strongly enforce the necessity for the horizontal position during all operations performed under anæsthetics, and at the same time explain the inutility of artificial respiration.

In a most valuable paper by my friend, Dr. Thomas E. Little, published in the *Dublin Hospital Gazette* in the year 1873, a suggestion is quoted that the cervical sympathetic system might be directly stimulated to reinduce cardiac action, or the over distended right cavities of the organ might be relieved by opening the external jugular vein. I fear a dissection to accomplish the first object could not be finished till life be fled completely, and the second would, in my mind, be treating a consequence and not a primary failure.

With ether, on the other hand, the dangers seem to originate in the respiratory apparatus or in the brain, and in addition to casualties being less frequent than with chloroform, they give more marked premonitory indications of their approach. Hence the necessity for a thorough examination of the lungs, and a vigilance in observing that respiratory difficulties do not throw excessive stress on the cerebral circulation.

That such conditions of lungs and brain finally implicate the heart is perfectly obvious, and in the only ether death at which I was ever present, the heart's action ceased as quickly as if that organ were primarily affected, but a post-mortem examination revealed the first stage of pneumonia in the bases of both lungs. These considerations would suggest that the employment of artificial respiration, aided by electricity in addition to the nitrate of amyl may be useful in such cases, whilst stimulating enemata and hypodermic injections must not be lost sight of.

The immediate dangers of nitrous oxide inhalation for a brief period in competent hands are insignificant, but there can be little doubt that unduly pressed asphyxia may result. It need hardly be said here that with all three agents the immediate stoppage of their administration, and the admission of fresh atmospheric air is the first principle of meeting danger; whilst, at the same time, reflex respiratory efforts may be invoked by the flipping of face and chest with a towel wetted with cold water. In furtherance of this object the tongue should be well drawn forward to dilate the entrance to the air passages.

In dental operations as well as in all others connected with the mouth, there are additional difficulties and dangers. The fact that the inhaler must be removed during tooth extraction adds very

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much to the difficulty of the procedure, and necessitates serious consideration as to the choice of the anæsthetic, which will depend, amongst other matters, upon the probable duration of the operation. Again, the chance entrance of blood or foreign bodies into the respiratory passages adds to the possibility of asphyxia. I have myself administered ether, whilst all the teeth—many of them reduced to difficult stumps—were extracted from one jaw, and I have seen as many as four teeth removed with one administration of nitrous oxide.

As to the comparative dangers of these three agents it is not easy to collect statistics, but in the article on Anæsthesia by Professor Syman, M.D., of Chicago, in "Ashhurst's Encyclopædia," published in 1884, the mortality in chloroform inhalation is variously given in round numbers as 1 to 3,000, 1 to 6,000, and 1 to 10,000. Ether is fatal in 1 case in 23,000, and the records of nitrous oxide are said to give one death in 140,000 cases.

As I mentioned before, my early surgical experience had reference only to chloroform, and although at a later period, influenced by my own observations and guided by statistics such as I have quoted, I adopted ether in preference, it is fair to repeat that in the only fatal case of anæsthesia at which I was ever present ether was the agent used. Nevertheless, with chloroform I had seen so many cases where serious alarm interrupted its use, I came to the conclusion that ether was more safe, and that the indications of approaching danger were more marked and earlier than in the case of chloroform. From these remarks administration to children must be excepted. They take the chloroform so well and the records are so free from fatalities that in their cases this anæsthetic retains its original prestige. In its administration there are two methods advocated, one its slow and gradual use, largely admixed with atmospheric air. This method is adopted by most anthorities. There are some, however, especially those educated in the Edinburgh School, who press it more quickly and less diluted; believing that by this mode insensibility is produced more rapidly, and with less saturation of the patient's system by the drug.

One very distinguished surgeon of great ability and force of character, Professor Sayer of New York, has always advocated that it should be given with very little admixture of ordinary air.

In defence of the more generally received method, it must be remarked, that in a large proportion of the fatal cases death has occurred after the inspiration of a very small quantity, varying

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from a few drops to a couple of drachms, and in the beginning of the process.

The varieties of apparatus for the administration of chloroform are almost innumerable. The two used most largely in this city are Skinner's, and the modification of the same known as Esmarch's. I believe they are the safest, but they have the disadvantage of allowing a great deal of the vapour to be diffused through the air, sometimes to the inconvenience of the administrator and the operator.

The sensation of commencing anæsthesia by chloroform is not, as I can answer for myself, an unpleasant one. There is usually none of the laryngeal spasm or cough, or sense of suffocation which are so marked accompaniments of the first inspirations of ether. In most cases where ether is employed there are two stages of anæsthesia. After the first troubles alluded to above are over, the next few breaths frequently produce a complete but transient state of anæsthesia. For short operations, such as, for example, the extraction of a single tooth, this stage usually suffices, but where a more prolonged insensibility is necessary, the drug must be pressed, and the administration continued for a longer period. In many cases it is not possible or perhaps desirable to produce a deep sleep, insensibility to pain is all that is required, and this is often present even when the patient is struggling.

In addition to the earlier difficulties as regards ether, this last complication—that of struggling—is much more common than in chloroform. It sometimes occurs with the first few breaths, sometimes marks the transition from the primary to the secondary stage of anæsthesia. It is always unpleasant, and frequently a most troublesome accompaniment. In dental practices where it is common for only two to be present—the operator and the administrator—the treatment of this complication requires energy, courage, and experience. Pressing the anæsthesia, even at the risk of appearing to use undue force, is the most merciful means of overcoming the difficulty.

As regards sickness of stomach, I have not observed any special difference in the use of the two agents, but I believe that fasting previously is the most effectual preventive.

Whatever difference of opinion there may be as to the gradual or rapid, the diluted or concentrated method of giving chloroform, no man of experience has any doubt that the more thorough and

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persistent the giving of ether is, the more satisfactory the result. Once the patient begins to inhale it the fewer free breaths of atmospheric air he gets, the better. When he cries out or struggles the inhaler, through a mistaken kindness, is sometimes removed—kindness truly mistaken, as it prolongs the struggling, exhausts the patient, delays the anæsthesia, and taxes unduly the muscular energies of the operators.

A few words of explanation in the beginning will be found of the greatest possible advantage. Tell the patient that his first impression will be that of being smothered, and that he will have the strongest inclination to put up his hands and push the apparatus from his mouth. Explain that there is no possibility of such an unpleasant occurrence, and that if he repress the inclination a few more breaths will remove the choking sensation. These initial difficulties have induced many surgeons to adopt the plan of giving a few inhalations of chloroform, of methylene bichloride, or of nitrous oxide, to dull the general and laryngeal sensibilities before beginning the use of ether.

Now, as regards the special appliances for administering it. In my mind the simpler the better. I have never found any reason to doubt the efficacy of the folded towel. It is cleanly, can be changed for each case, does not oblige the patient to inspire altogether his own exhalations, seldom fails. It may, indeed, take a little longer time and may require a drachm or two more of ether. Two methods of folding the towel we are accustomed to here. One is like making a conical paper bag with a sponge placed in it to prevent the ether from being too much diffused. As this admits excessive admixture of air, an ordinary piece of newspaper folded similarly, slipped over the towel and tied at the top, increases the efficacy, without adding to the danger. The second plan is by folding the towel smaller, like making a paper cocked-hat or boat, and as there are more layers of towel the paper covering is unnecessary. Most other apparatus have the disadvantage of uncleanliness from constant use, of re-breathing of expired gases, and more or less complete deprivation of atmospheric air. The special dangers I shall allude to when I have dealt with the use of nitrous oxide.

From my experience of this agent I can state that it is a rapid, and not unpleasant method of producing anæsthesia, somewhat short in the duration of its effects, and requiring to be again administered if more than one or two teeth at the most have to be

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extracted. I know that my most experienced dental friends are strong in the view that its use should not be prolonged by repetition at a single sitting, and that, consequently, it should only be employed for short operations. Contrast this with the use of chloroform and ether, under which gases I have seen patients kept for periods varying from an hour and a-half to over two hours. The after effects of nitrous oxide present no unpleasantness, there is not the sickness, nor the headache, nor the feeling of intoxication which so frequently attends the use of the other agents. The most alarming characteristic of it is the appearance of the patient. The livid face, stertorous breathing, and purple tongue, are so strongly suggestive of suffocation, that the operator must, almost of necessity, give a sigh of relief when the patient so quickly returns to consciousness.

In jotting down the preceding observations, I have endeavoured to keep as clear of mere theory as I possibly could. I have not desired to say, even if I could do so, anything new or original. I have endeavoured to bring briefly before the minds of my hearers the difficulties and dangers of every-day practice, and for this reason I have avoided even mentioning the various other drugs and means which have been suggested as anæsthetics.

In the article by Professor Lyman, from which I have quoted, I find a list of no less than nineteen agents, in addition to the three I have named. For chemists and physiologists these must have an interest, and possibly in the future for surgeons.

To sum up, then, as regards possible dangers, they may approach through heart, lungs, or brain. How are they to be anticipated? By knowing the condition of each. Hence the necessity for careful examination of thoracic organs, and the acquisition of such a knowledge of the state of the brain and its circulation as can be gained by the antecedent history and the general condition of the arterial system. Let this examination, together with the exigencies of the particular case, guide us in our choice of agents. Let this dictate the position of the patient and the symptoms to be watched for. Then, as regards treatment, omitting heroic remedies, there are nine procedures at our disposal.

1. Stopping the administration.
2. Admission of fresh air.
3. External stimulation of respiratory system—drawing forward tongue.
4. Use of nitrate of amyl.

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5. Artificial respiration.
6. Inversion.
7. Electricity.
8. Hypodermic injection of ether.
9. Stimulating enemata.

I have dwelt only on the practical points which must have arisen in the experience of every gentleman here present. It will thus be competent for all who take part in the discussion to raise questions that may be answered by other speakers or to resolve doubts that may exist. The importance of the subject to dental surgeons can scarcely be over-estimated. A very limited number of the population, comparatively speaking, require the procedures of general operative surgery. On the other hand, how numerous and how increasing is the class whose troubles dental surgeons must meet. How few would suffer for any lengthened period the excruciating pain of a diseased tooth, except for the horrible though brief agony attendant on even the most skilful extraction. Having had experience of both, I would accept with gratitude anæsthesia in my own case, notwithstanding its occasional risks. To understand, foresee, and diminish these, is equally an object with our whole art and its various branches.

The PRESIDENT said it was quite unnecessary for him to remark upon the deep research exhibited in Dr. Corley's paper, and the interesting details which it embodied. The subject was, of course, one provocative of considerable discussion.

Mr. R. N. H. KING (Newark), said it had been stated that four teeth had been extracted during one inhalation of nitrous oxide. He believed that many more than that might be drawn under a single inhalation provided they were not difficult of extraction. The practice of administering ether *per rectum* had not been referred to. There might be objections to it, but still it was wonderfully effective according to his experience. On the preceding day he extracted fourteen teeth, using ether in that way. The ether was boiled and the vapour administered through a tube; and in two minutes after the boiling point had been reached the ether could be smelled from the patient's breath. After seven minutes the patient was under the influence; and the operation lasted twenty minutes. He had another case of the removal of a polypus under ether which took rather longer.

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Dr. PEARSALL: What is the *modus operandi?*

Mr. KING: You have an ordinary enema tube and you put the ether in water. It boils at a very low temperature; and as it keeps evaporating the vapour is admitted up through the rectum.

Mr. AMOS KIRBY (Bedford) considered laughing gas by far the safest anæsthetic. On more than one occasion he had extracted from twelve to fourteen roots with it. In the face of that he did not see what other anæsthetic dentists required. He always made his own gas, and had an apparatus for the purpose.

Mr. COFFIN (London) asked whether the administration of vapour of ether *per rectum* was calculated to produce inflammation of the bowels.

Mr. KING: Out of twenty-five cases, I never knew one in which that occurred.

Mr. CLARKE (Belfast) said during the performance of a surgical operation in the Royal Hospital of Belfast, he was able to keep the patient thoroughly under the influence of the gas for eighteen minutes, and during the whole of that time no unpleasant symptom occurred. He believed the time was not far off when nitrous oxide would be generally used, not only in dental, but in surgical operations.

Mr. UNDERWOOD (London) said that cases now and then occurred in which nitrous oxide proved to be not the best possible anæsthetic. A case had recently come under his notice of very peculiar intolerance of it. After the administration began, the patient experienced a sensation of tightening round the head, which soon became so intolerably painful that after having twice submitted to the agent, she declined to endure it further, the agony was so great. Yet that patient proved a favourable subject for chloroform, and afterwards had some teeth extracted under the influence of the latter drug, but of course in a recumbent posture. It was quite true that a great number of deaths from chloroform had occurred in dental surgery, but in these the posture during administration had been a sitting one. Dr. Corley had suggested that there should be a careful examination of the heart before administering anæsthetics. There were two ways of looking at that. Such an examination might frighten the patient by suggesting heart complications that might be unsuspected and that would not influence the administration if their presence were demonstrated. He considered that there were very few heart complications capable of immediate diagnosis that would counter-

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indicate the administration of nitrous oxide. Certain forms of fatty degeneration which were difficult of diagnosis might be an obstacle to the use of chloroform, but on the other hand in such cases the shock accompanying the removal, without an anæsthetic, of the bad teeth, would be worse than the chloroform. On the whole, he was opposed to examinations of the heart as tending to frighten rather than to reassure. As to the number of stumps that might be taken out under nitrous oxide, thirty-two might be extracted instead of fourteen, provided they were all loose and ready to come out; whereas one old broken-down wisdom tooth might foil the operator. Every now and then the practitioner would have an operation which would require more time for its proper performance than could be obtained with the present mode of administering nitrous oxide, and repeated administrations of that gas he considered to be rather bad.

Mr. WOODHOUSE (London), said his experience had been limited to laughing gas; but about six months ago an example of paroxysm of the larynx produced by it came painfully under his notice. He and his friend and colleague, Dr. Bennett, had successfully removed a left upper molar when the patient, instead of recovering from the anæsthetic in the ordinary manner, became quite black in the face, and after having vainly used the ordinary artificial methods of restoring respiration, they were obliged to open the trachea. They did so with a successful result, the air rushing in with such force that the sound was heard across the room. The patient made a perfect recovery. With regard to the number of extractions to be made at one time, it should be remembered that there was a healing process to follow, and if too many teeth were taken out at once there might be inflammation, and a suppurative discharge which might be swallowed with bad results. With such a safe anæsthetic as laughing gas, it was far better to take out only a few teeth at a time.

Mr. COFFIN asked was nitrous oxide more likely to produce laryngeal spasms than other agents?

Mr. WOODHOUSE said that his patient, who had the spasms, had previously suffered from an attack of rheumatic fever, which was followed by a thickening of the cervical vertebræ.

Mr. HUTCHINSON (London), said he endorsed what had been said by Mr. Underwood as to the importance of the recumbent posture when chloroform was administered. Dental surgeons

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would be wise if they made it a rule never to administer chloroform in their own houses at all. They should always make arrangements to have it done at the patient's own house, and the patient should be clothed in the loosest possible garb.

Dr. C. E. FITZGERALD, Dublin (Surgeon-Oculist to the Queen in Ireland), said that in his particular branch, by the use of cocaine they had been able to dispense, to a large extent, with the use of anæsthetics. From what he knew of nitrous oxide he was not in favour of giving repeated doses of it.

He once extracted an eye under the influence of nitrous oxide, but he was not altogether satisfied with the result, and he never employed it again. He was in favour of examining patients before administering anæsthetics. He always did it himself as a matter of prudence. If there should be an inquest the first question that would be asked would be, "Did you examine the heart?"

Rev. Dr. HAUGHTON, F.T.C.D.: It is the first question a jury asks.

Mr. PEARSALL said he concurred with Mr. Hutchinson as to the desirability of always making deliberate arrangements for any serious operation in the patient's own house. It had been his practice for a series of years, and was desirable on the grounds both of safety to the patient and of convenience to the practitioner. He was also in the habit of directing the patient to fast, for the occurrence of sickness during an operation was both dangerous and disagreeable. Such directions were always followed by sensible people. They should also be informed beforehand as to what things were wanted for the operation. His experience was in favour of giving ether in the way Dr. Corley recommended. Under that agent the patient got a rosy aspect, instead of the pallor produced by chloroform and nitrous oxide. He was certainly an advocate for the greatest deliberation in connexion with the employment of anæsthetics. They heard occasionally of persons who got them and yet felt pain all the time of the operation, from which he inferred that those patients had not been properly put under the influence of the anæsthetic at all.

Mr. STOREY (Hull) said they seemed to be agreed that for smaller operations nitrous oxide was undoubtedly the best. He had persistently refused to administer chloroform in his own house, because he considered that there was considerable danger attendant upon the administration of it. He was in favour in pro-

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longed operations of Dr. Dudley Buxton's practice of first using nitrous oxide and then changing to ether, the effect of the second administration being to prolong the period of insensibility to fifteen or twenty minutes.

Mr. TOMES asked what was the operator to do if, after a thoracic examination, he found that there were signs of heart disease? He had two patients who had very bad aortic murmurs. One of them had been previously a patient of Dr. Wilson Fox, who always urged that he should be given an anæsthetic, as the danger likely to arise in connexion with it was less than what might result from shock and pain. That patient had taken nitrous oxide supplemented with a certain amount of ether, and had never given any particular anxiety. He had known a great many patients having mitral murmurs, who had taken laughing gas over and over again with perfect impunity. He had had more upsets with patients having mitral disease than with those labouring under aortic. Several of the former had fallen into little faints and given him some anxiety, while with the latter class he had never had any trouble at all.

The PRESIDENT said that some years ago a lady came to him for the purpose of having a couple of stumps removed. He applied nitrous oxide, but she did not like it and insisted upon chloroform. He yielded to her objection, and removing the nitrous oxide face piece, applied the chloroform with a napkin as recommended by Dr. Corley. The moment he put it to her mouth she fell into a complete state of anæsthesia. He made the best use of his time and took out the stumps; but on looking at her then he thought she was dead. The muscles of her cheeks were destitute of all motion, her colour cadaverous and her skin covered with an exudation. Her husband, a clergyman, was the only other person present. He (Mr. Corbett) was thoroughly frightened; however, after he had employed means of producing artificial respiration she recovered. He registered a vow that he would never mix nitrous oxide and chloroform again.

Dr. CORLEY, in reply, said he considered abstinence before the administration of an anæsthetic extremely important, particularly in the case of chloroform. Dr. Thomas Little was rather inclined —because chloroform depressed the heart's action—to give the patient something to eat, if he had taken nothing for twelve or fifteen hours; but he (Dr. Corley) believed that to be wrong. The prospect of an operation was often enough to prevent a patient's

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breakfast from agreeing with him, and it would probably be not digested. On the other hand, he did not see any objection to the patient getting some slight stimulant, which would not sicken the stomach and would not lead to the danger of asphyxia, in the event of sickness, from pieces of solid undigested food getting into the larynx. As to making of examinations, it was his experience that patients expected them and were not at all alarmed by a stethoscope. On the contrary, the prospect of the operation was much more calculated to alarm. There was scarcely any conceivable condition of the heart in which some anæsthetic might not be given; any heart that could bear the operation could bear the anæsthetic. But to administer anæsthetics to a patient without trying to find out whether he had mitral regurgitation or aortic obstruction, would be to act without knowing what they were doing —it would be, to use an American phrase, "ostrich surgery." His own experience of anæsthetics had been tolerably prolonged, and he had never given them in cases of asthma, or cases in which they would be sure to produce cerebral congestion.

The Annual Museum and Its Contents.

By ARTHUR W. W. BAKER, M.D., F.R.C.S.I.

SURGEON TO THE DENTAL HOSPITAL OF IRELAND.

In thinking over subjects for a paper at our annual meeting I came to the conclusion that I could not do better than direct your attention to the many interesting specimens contained in our annual museum, inasmuch as being the secretary or curator I should of necessity be more familiar with them than many of you now seeing them for the first time. Also the system upon which we have arranged them needs perhaps a little explanation; in short, that my paper should be more or less a commentary on the catalogue. These views being entirely endorsed by my colleagues require no further apology.

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Those who have never arranged a collection have but a small idea of its difficulty; in many instances specimens were sent to us with no further history than their owner's name and address, and in some cases not even that—these we had to diagnose, describe, and remit to a class. Then the question of classification gave us many hours of anxious thought, for, as far as I know, there is no standard or recognised system, and to many anatomical or pathological divisions there are grave objections which may be reasonably advanced; for instance, in many cases of fusion of teeth it is difficult to decide whether it arose through a developmental abnormality or a pathological increase in the cememtum; or to determine whether a particular tooth was of the species known as warty, or a supernumerary. These and other questions of a like nature troubled the minds of your museum committee, anxious as far as possible to make their catalogue free from obvious objections. That we have been quite successful we can hardly hope, but we may lay claim, I think, to have very materially lightened the labours of future museum committees, by inventing the machinery for working a museum. Of course it would not be possible for me to speak of all, or even most of the many valuable specimens contained in our museum, but I hope to bring under your notice those that it would be a pity to leave unseen. In forming this museum we were at first disposed to lay aside many specimens which did not appear to be of any special value; but on reflection it seemed better to keep all specimens, and to group them, and we are now excessively glad that we did so, for by grouping a number of specimens one elucidates the other. Also since the museum has been formed I have heard men exclaim, "Oh! I had several specimens like this but I did not think it worth my while to keep them, much less make a note of them!" I would take the liberty of reminding you that, when the so-called wise men or astrologers of many hundred years ago, noted the appearances of certain stars they little thought that by their observations they were furnishing some of the data for the more accurate solution of certain astronomical problems of the present day; so it is with all scientific facts, by the grouping of a large amount of material which, taken individually, has but little significance, we are enabled to draw conclusions which may lend important aid to future investigations.

This idea should be ever present in our minds when we are inclined not to take the trouble of making a note of a specimen

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because at the present time it seems to have no importance or practical bearing. I would therefore urge upon all the importance of keeping accurate notes of specimens, not trusting to memory, which is apt to be treacherous, but carefully making, in black and white, a trustworthy record upon which we may hereafter securely found scientific conclusions.

Classification.—In making our classification we decided to begin with the abnormal teeth in bottles, to pass from them to the wet and dry preparations of jaws and associate parts, human and comparative, and to graduate through the models to the workroom section. This order, owing to a difficulty of numbering, we were unable to carry out, so were obliged to place the models immediately after the abnormal teeth.

The teeth we divided first into two great divisions, congenital or developmental and pathological or acquired deformities; of course, strictly speaking, pathological might include the former division, but we wish the term to be taken in its ordinary significance; the sub-divisions I shall explain as I proceed.

Odontomes.—In commencing our catalogue with odontomes we have more or less departed from the order usual in text-books, the idea being to take first those abnormalities which affected the entire tooth germ. The odontomes we have sub-divided into—odontomes odontoplastiques, odontomes coronaires, warty teeth, odontomes radiculaires, and enamel nodules.

The mixed classification that we have adopted from Broca's and Salter's divisions, may be fairly objected to, but on the other hand, it is generally admitted that most classifications of these tumours are unsatisfactory and do not altogether fulfil their object; even the latest, that proposed by Mr. Bland Sutton, does not quite get over the difficulty. The division we have made has at all events the merit of enabling us to describe better the present collection.

The tooth tumours are fitly headed by the interesting specimen contributed by Mr. C. S. Tomes; it consists of a confused mass of dental tissues studded here and there with small portions of enamel, and does not bear any semblance to a tooth; we have classed it as an odontome odontoplastique according to Broca's division. The odontome coronaire shewn by Mr. Macleod is a beautiful specimen in many ways, it shows the union of a pair of tooth germs one of which is involuted as regards its crown; it will perhaps be best understood by reference to the woodcut

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which will be found in another part of the museum. We have called Mr. Hele's odontome a warty tooth, of which it is a typical example; it was removed from the ramus of a patient aged eighteen, and appears to be the fused germs of the second and third molars.

To notice all these delightful specimens in detail would be wearisome and monotonous to all of you, so I shall content myself with speaking of but one or two other specimens. The warty teeth exhibited by Mr. Macleod and Mr. Canton, are on the borderland between supernumeraries and warty teeth, but after some discussion it was thought better to place them in the latter class. The specimen labelled odontome radiculaire lent by Dr. Hunt of Yeovil, and described by him very appropriately as a "nutcracker for the Odontological Society," received by a process of exclusion its present title, as its malformation seemed to have taken place during the formation of its root. The enamel nodules are well represented, no less than eight examples will be found in the museum, two of these being contributed by the respected vice-president of the Irish Branch. Another excellent example is to be seen in the museum of the Royal College of Surgeons, but as we had sufficient specimens contributed by our own members, we thought it better not to borrow it.

Before, however, leaving this class I would direct your attention to two specimens of extreme interest in the section containing the comparative pathology, viz., No. 1386, showing the development of an odontome from a tooth with a persistent pulp, and No. 1398, which is an odontome, from the jaw of a sheep.

Abnormalities of Crown.—The transition in abnormalities of the crown from enamel nodules to supplemental cusps being an easy one, we have placed these next in the catalogue. There are only two specimens, which may be accounted for by the fact that some specimens, although possessing this peculiarity, possess others of a more important nature, which necessitates their being placed in a different class.

The models displaying supplemental cusps may be advantageously studied in connection with this class.

Degeneration of Wisdom Teeth.—The other abnormality of the crown is headed "Degeneration of wisdom teeth." These teeth, more than others, with the exception of the upper laterals, show a tendency to deformity and disappearance; of the four specimens in this class perhaps that shown by Mr. Murphy, of Bolton, is the

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most interesting, it approaching the type known as "carnassial." This is also displayed by model No. 1,002; Dr. Stack drew my attention to this peculiarity.

Supernumerary.—Of supernumerary teeth we have a goodly show, no less than 34 specimens chiefly from the incisor region, and comparing these with the models in the supernumerary class we may argue that this abnormality is a fairly common one, and taking both these in connection with supplemental teeth we can see how nature frequently endeavours to revert to her typical mammalian dentition.

Abnormalities of the Root.—From supernumerary teeth we come to abnormalities of the root. These we divide into supplemental or extra number of roots; fused or deficient number of roots; and abnormalities as to form of root. Those teeth having a supplemental number of roots we have arranged in regional order, grouping together incisors, canines, bicuspids, and molars. We have further placed them in their anatomical positions, that is, the upper teeth have their roots pointing upwards, and the lower teeth theirs pointing downwards. This arrangement, I may add, has been carried out throughout the collection as far as possible.

Out of nearly 130 specimens of extra roots we have but one in which the incisors show this abnormality, consequently we may conclude that it is rather rare. As we move round the arch, however, we find that the canines frequently tend to develop double roots, and in these cases it is generally, if not always, the lower canine rather than the upper. The lower bicuspids have rarely two roots, while a three-rooted upper bicuspid is fairly common. The molars frequently increase the number of their roots, the increase being generally limited to a single extra root, and this observation would apply more particularly to incisors, canines, and bicuspids.

Diminished number of Roots.—The consideration of teeth with an excessive number of roots will at once lead to those cases in which we find a diminished number of roots; this appears principally to occur through cemental fusion, and although we have placed these teeth among developmental peculiarities, in many instances it might fairly be urged that the abnormality is pathological, so this division is in some cases an artificial one.

Abnormalities of Form in Roots.—Abnormalities of form in roots we have divided into—Recurving, Diverging, Bayonet, Oblique, and those with cupped apices.

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Abnormalities of Form.—The many and varied curves exhibited by the roots of the teeth in the next class, seem common to all teeth, and will naturally excite wonder how some of them were removed without fracture. Bayonet-shaped roots deserve our attention as adding to the difficulties of fang filling, and doubtless have a similar ætiology to dilacerated teeth.

Mr. Pearsall has drawn attention to oblique rooted molars as being peculiarly difficult to extract; I fancy a forceps with a loose joint would in many cases overcome the difficulty. Diverging roots do not require special notice.

Teeth with Cupped Apices.—Teeth with cupped apices have been described and figured by Mr. Tomes in the last edition of his *Dental Surgery.* We are fortunate in being able to show seven specimens. This malformation occurs principally in bicuspids and molars.

Dilaceration.—We are fortunate in possessing eight specimens of dilacerated teeth, five of which are contributed from this city. We have divided these into diastasis of the crown; and diastasis of the root.

The former we have sub-divided into diastasis of the crown forwards, and diastasis of the crown backwards. Molars alone are not included in this class, though, as Mr. Tomes has remarked, there is no reason why we should not meet them. We have relegated all doubtful or slight cases to the curved root class, but in many specimens it is extremely difficult to say when dilaceration begins and sharp curving ends.

Union of Teeth.—Gemination and fusion is the sub-division we have used for united teeth—the former a developmental abnormality, the latter a pathological process, which as such should have been placed later on in the catalogue, but it makes this class more complete to leave it where it is. Reference to the catalogue will show that gemination is more common amongst deciduous incisors than any other class of tooth, and among these there are two specimens of trigeminated teeth.

Macrodonts and Microdonts.—Abnormally large teeth with those below the average size constitute a special class which I need not describe.

Exostosis.—The most striking acquired abnormality is exostosis; this is classed by Mr. Salter as an odontome. Without in any way wishing to controvert his opinion we have thought it more convenient to relegate it to this position in the catalogue.

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Nearly a hundred specimens, some of them quite curiosities from their size, show this common affection. We have not attempted any further sub-division.

Calcification of the Pulp.—That the deposit of lime salts in the pulp is of such every-day occurrence must be the reason why we have only two specimens in this class. However, in another part of the museum you will find a beautiful preparation by Dr. Williamson of Aberdeen, and among the specimens lent by the College of Surgeons a beautiful example of this affection given to the College by the late Dr. Grimshaw.

Absorption of Root.—Some forty-five specimens are included under this heading. Thirteen of these contributed by Mr. Pearsall have a definite history of accidental injury; as might be expected, these only include incisors and canines.

Erosion and Attrition.—The erosion and attrition class derive a special interest from Mr. Underwood's communication to the Odontological Society, which is doubtless fresh in all our memories. Among the models under this head will be found the casts which illustrated his paper. I would also have you notice specimen No. 805 in the College of Surgeons' collection, a tooth which is nearly cut in two as by a thread.

Fractured Teeth.—That the hard tissues composing teeth should occasionally give way is not to be wondered at, considering the rough usage they receive, and the force represented by the muscles of mastication. There is, however, a cause for regret in the fact that there is no specimen showing the rare occurrence of a united fracture in this class—a defect which I am sure will be remedied in the museum of 1889 at Brighton.

I cannot pass from this subject without directing your attention to the extremely beautiful preparation and drawing lent by Dr. Williamson of Aberdeen, representing a fractured incisor; it will be found at No. 859. I think in connection with this subject you might notice in the comparative pathology section No. 1382, which shows the results of fracture of the incisor teeth in a monkey.

Salivary Calculus.—Some large examples of this deposit are to be found in the museum, chiefly between Nos. 830 and 860. The specimens in the smaller bottles we have further subdivided into those where the peculiar colour is supposed to be due to pus, and those where the pigmentation is said to be acquired from blood; the deposit in these cases is more nodular than the ordinary tartar.

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Stained Dentine.—The red hue sometimes observed round the necks and fangs of molars, and occasionally showing through the enamel of incisors I have found to be due to the inflammation excited by arsenious acid, setting free the hæmoglobin or colouring matter of the blood—four examples will be found in the museum.

Complication of Extraction.—Some fifty odd specimens illustrate the various accidents which may attend the extraction of teeth, and teach the necessity of caution and due deliberation in the performance of this operation; this remark, in my experience, is more particularly applicable to the temporary teeth, to the careful removal of which the public, and even sometimes our medical brethren, attach so little importance.

Mercurial Teeth.—We have retained the name mercurial for the teeth in this class, not that we believe that the peculiar markings are caused by the administration of mercury for the maladies of early childhood, but the term associated with Mr. Jonathan Hutchinson's excellent description conveys the idea of a malformation with which we are all familiar. To the eruptive fevers is traced this suspension of the functions of the enamel organ, and also of the odontoblast cells. To the category of chicken pox and measles, I would add whooping cough, which, in my experience, is a most potent factor in the production of this deformity. The central incisors belonging to these teeth also frequently present that notching which is so characteristic of hereditary specific disease, with this difference, that the incisors are not peg-shaped, and are not placed at that peculiar inclination to one another which is almost a diagnostic peculiarity in Hutchinson's teeth, so often does it occur. This description may not be intelligible to all, but a glance at the models from 1131 to 1150 will, I hope, make my meaning clear. Those interested in this subject should not fail to see the excellent preparation of jaws containing mecurial teeth lent by Mr. Pearsall (No. 1364), also the well-marked teeth lent by the College of Surgeons (No. 828), and presented to their museum by the late Dr. Grimshaw.

Arrest of Decay.—That the decay in teeth is frequently arrested in its downward progress is certainly true, and is well exemplified by the three specimens in our collection. Upon the vexed question of the redeposition of lime salts I shall not enter, as I think it can be more advantageously discussed elsewhere.

Neuralgia.—For bringing under your notice a collection of roots and teeth with a definite history of neuralgia, Mr. Pearsall

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certainly deserves praise, and his description is so full that it requires no further comment on my part.

Miscellaneous.—The last eighty specimens in this part of the museum are grouped under the title of miscellaneous, and conprise specimens that could not conveniently be placed in other classes. They have, perhaps, a greater antiquarian than scientific interest, if we except the teeth which have been replanted and some few others. The replanted teeth will doubtless have a special interest in connection with Dr. Cunningham's paper on implantation. If I pass over these specimens without notice, it is not because I do not attach due importance to them, but reference to them might exclude others of greater general interest, through lack of time.

College of Surgeons' specimens.—To most of the specimens contributed by the Royal College of Surgeons I have already alluded; it remains therefore but to note the unusually large specimens of exfoliated alveolus and teeth contained in bottles Nos. 816 and 823. There is also an interesting specimen, No. 825, of exfoliation after cholera; there is a note appended that mercury had been administered in this case, so perhaps the drug had as much to say to the lesion as the disease.

Specimens in Large Bottles.—The specimens in large bottles are more or less of varied interest; to many of them I have already drawn attention in connection with other specimens. There are some fine examples of molars united by fusion to be found in bottles No. 834 to No. 838 inclusive; but the specimen which perhaps is unique is No. 839. Here we find an example of a tooth firmly ankylosed to the alveolus; the tooth has on its root an ivory exostosis. Whether this is a true ankylosis is, of course, difficult to say without a microscopic examination, which in the interests of science I would strongly urge upon its owner, Mr. Palethorpe, to have made. The possibility of the floor of the antrum being perforated by the roots of the wisdom tooth is well shown by specimen 846, contributed by Dr. Stack, and we learn from it the practical lesson not to overlook the wisdom tooth when seeking for the origin of an abscess of the antrum. At No. 848 we find an exquisite wax model lent by Mr. Arthur Underwood, representing portion of a jaw, the seat of dentigerous cyst excised by M. Maisoneuve. The figure is doubtless familiar to all who have read Mr. Heath's essay, so you will hail the specimen as an old friend in another dress,

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Models.—We now turn to the section of the museum devoted to plaster casts. We have divided these into irregularities of the teeth, irregularities of a jaws, injuries and diseases of the teeth, diseases of the gums, and injuries and diseases of the jaws. In round numbers we have about 400 models, comprising many casts that will interest the general surgeon as well as the specialist.

Irregularities of Teeth.—We have subdivided the irregularities of teeth into irregularities of number, irregularities of form and irregularities of position.

Irregularities of Number.—Irregularities of number we have further subdivided into supernumerary and supplemental teeth, and those abnormal dentitions where there is a deficiency of teeth. As I have already referred to the models of supernumerary and supplemental teeth, I shall merely direct your attention to the models Nos. 971 to 973 inclusive, showing supplemental bicuspids. Mr. Underwood's case was fully described in our Journal some time ago. Those very interesting models of Mr. Hepburn's showing deficient dentition are associated, as is frequently the case, with an abnormal development of hair; this is fully described in the catalogue.

Abnormalities of Form.—Abnormalities of form we have subdivided into degenerated teeth, geminated teeth, and teeth with supplemental cusps. As I have touched on all these before I need hardly say more about them, except that bicuspids are here shown to be variable in size, and that the lower central incisors are not exempt from degeneration.

Irregularities of Position.—Teeth outside the normal arch, teeth inside the normal arch, teeth transposed, teeth rotated and various irregularities, have been adopted as the subdivisions of the class Irregularities of Position. I have no doubt a better division can be made, but with the comparatively small number of models of regulating cases sent to the museum, I think it was the best under the circumstances. I would have you notice the excellent plan by which Mr. Renshaw shows the plates used by him in regulating, viz., to take a model of the patient's mouth with the apparatus, *in situ;* it at once shows many points which a description would fail to convey.

Macrognathism and Micrognathism.—Side by side we have placed models of a large negro jaw, the jaws of the lady who played the Amazon Queen in "Babil and Bijou," and the diminutive jaws of General Mite; the contrast is curious. In this class will also be found examples of the V-shaped maxilla and contracted arch.

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Injuries and Diseases of the Teeth.—Erosion and attrition, late and difficult eruption, fractured teeth, mercurial teeth and syphilitic teeth, are all included under injuries and diseases of the teeth. As I have already spoken of erosion, I shall proceed to notice retarded dentition. The most interesting model in this class is that contributed by Mr. Weiss; it will be recognised at once as the original of the illustration in several of the text books of the unerupted inferior wisdom tooth lying horizontally in the jaw.

Mercurial Teeth.—I have little to add to the remarks which I have already made on mercurial teeth; the six-year old molar is the tooth upon which we must rely for the typical markings. Mr. Hutchinson has drawn attention to the marked distinction between the white bicuspids and the discolored canines and molars between which they lie.

Syphilitic Teeth.—The frequency with which the teeth associated with hereditary syphilis show evidences of the mercurial taint, is as remarkable as the notching of mercurial teeth to which I have already alluded; it is somewhat remarkable that all the models in these classes, with the exception of Mr. Brunton's, have the names of Dublin contributors attached. I can scarcely imagine that our English and Scotch brethren do not take an interest in these matters.

Diseases of the Gums.—Under diseases of the gums we have classed together—epulis, hypertrophy, papillomata, ulceration of the mouth. We are fortunate in possessing some excellent specimens of epulis; I would especially recommend to your notice No. 1164 as an unusually large example, which however is completely dwarfed by the wet preparations contributed by Dr. Stevens' Hospital, *vide* specimens No. 1338 to 1340 inclusive. The models of hypertrophied gum exhibited by Mr. Weiss are sure to attract your attention, as are also the jaws of Julia Pastrana or the pig-faced lady. The examples of papilloma, only two in number, are worth looking at, as they are comparatively rare; you will find them at 1171-2. Mr. Hepburn's models of closure of the jaws and ulceration of the mouth are so artistically realistic as to be quite startling and must be seen to be appreciated.

Injuries and Diseases of the Jaws.—Injuries and diseases of the jaws we have subdivided into—cleft palate, necrosis, alveolar abscess, dentigerous cysts, exostosis of the jaws, tumours, excessive absorption, and fractures. The cleft palate class naturally falls into the two subdivisions, congenital and acquired, and shows many

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interesting specimens. I would specially notice the admirable model, contributed by Mr. Andrew of Belfast, in which the cleft runs on either side of the intermaxillary bone. Mr. Andrew has further contributed to the interest of the case by some excellent photographs showing the case both before and after operation; these will be found in the screen with the other transparencies. In connection with the acquired clefts, I would ask you to study the interesting skulls contributed by Professor Bennett of this University, showing perforations of the hard palate produced respectively by syphilitic, scrofulous and lupoid ulceration.

Necrosis.—We have eleven excellent models showing the result of necrosis of the jaws; no less than five of these found their way to Dublin from Italy, being contributed from the museum at Turin, by Dr. Martini; we are also fortunate in being able to show five casts of the results of phosphorous necrosis, a disease which now is happily far from common.

Alveolar Abscess.—The casts of alveolar abscess require no observations; they are fully described in the catalogue.

Dentigerous Cysts.—Dentigerous cysts include those due to unerupted teeth, and those caused by chronic irritation round the roots of teeth fully developed. Before leaving this subject I wish to direct your attention to specimen 1580 showing forty-four denticles contained in a dentigerous cyst. It is exhibited by Mr. Sims of Birmingham. Exostosis, tumours and absorption of the jaws do not require special mention beyond what is in the catalogue.

Fractures.—We have placed fractures of the jaw designedly near the end of the catalogue, close to the workroom section where will be found their splints; as these come within the province of my colleague Mr. Murray, he will describe them better than I can.

Comparative Anatomy.—Trinity College has opened the storehouse of her treasures to lend us many interesting specimens of comparative anatomy—a subject in which we must all be more or less interested. I would have you notice the beautiful preparations in spirit from frozen sections of the ourang-outang and chimpanzee.

Human Anatomy.—The class devoted to human anatomy contains some interesting collections of young jaws, showing the first and second dentitions, contributed by my colleague Dr. Stack. The members of the Association will doubtless be interested in

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seeing how the prognathous jaws at the end of this class lead up to the jaws of the chimpanzee in the next class, containing the comparative anatomy.

We now get into a region of specimens of much and varied interest; from the comparative anatomy you will pass to human pathology, enriched by many valuable contributions from the museum of surgical pathology, presided over by Professor Bennett of this University. The Odontological Society have generously sent us some of their best specimens of comparative pathology; these you will find in a case by themselves, to some of them I have already alluded. Were I to dwell on them as they deserve and as I should like, I should detain you beyond the limits which the committee have wisely allowed for each paper. For the omissions and defects in the catalogue I must crave your kind indulgence, and plead in excuse its first appearance.

The Ex-President (Mr. Brownlie), who occupied the chair in the absence of the President, said he had been especially interested by the reference made in the paper to the collection of syphilitic teeth, a collection which had been obtained principally in Ireland. One or two of his medical friends had expressed a wish to have casts of these teeth.

Mr. Blandy (Nottingham) said he considered that the Association were greatly indebted to Dr. Baker and the Museum Committee for this museum. He had never hoped to see one so good.

Mr. Pearsall said it might be interesting to mention how his friends and himself in Dublin had become so interested about the museum. He (Mr. Pearsall) wrote to a member of the executive of the Association asking him to give the names of members of the profession who would collect specimens, and he received from him a very curt reply to the effect that he took no interest in the collection of curiosities. Their enthusiasm was fired from that moment, and now he hoped that gentleman would admit that curiosities had a value. They had spared no pains in the arrangement and classification of the museum to make it interesting. As one who had taken an active part in the arrangement of the museum he could say that there was hardly a specimen in it that had not cost at least a quarter of an hour's labour. He would urge the Association to have annually a museum which would be worthy of the profession. He thought he might say without vanity that they in Dublin had

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shown them how to do it; and he hoped they would all put their hands in their pockets and provide themselves with a set of apparatus which could be used annually for the exhibition of the specimens. But the organization of a museum in connection with the annual meeting should be the work of the whole Association and not of a few members. They in Dublin had been greatly disappointed by friends promising contributions and not sending them. However, they did not wish to exhaust all the material; and he thought there was nothing to prevent the Association having a special museum next year. He would be delighted to co-operate with his friend Mr. Dennant in the matter.

Mr. DENNANT (Brighton) said the museum they had seen was so remarkable a one that it seemed a great pity that its contents should be dispersed. It would, he feared, be impossible for a provincial town like Brighton to compete in the working up of a museum of this kind with a city which was a university centre. It was difficult to work with men at a distance in the matter—they should be on the spot. And if they should be unable to organize such a collection at Brighton next year he hoped that the subsequent annual meetings would be so arranged as to be held in centres where it would be practicable to secure a good array of specimens. When the affair should become annual, however, he feared there would be a little more difficulty in the supplying of specimens.

Mr. WOODHOUSE (London) said he thought the question as to whether the present museum could not be preserved wholly or in part was well worthy of consideration. Many of the gentlemen who had sent specimens might be willing to give them up if they were to be kept in a permanent museum. Of course all the specimens could not be retained, as some of them belonged to the Odontological Society.

The meeting then adjourned to the following day.

THE PRESIDENT'S GARDEN PARTY.

At five o'clock the President and Mrs. Corbett received members and friends of the Association at a garden party in the Fellows' Gardens. An immense number of guests were present, and although Jupiter Pluvius insisted upon joining the party it was

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evident that it required more than a shower of rain to damp the spirits of the Association, and the veteran President had the satisfaction of triumphing over the weather. With the kind permission of the colonel and officers the splendid military bands of the Black Watch and the King's Own Regiments, conducted by Mr. Buck and Mr. Leeson respectively, played capital music, and underneath a capacious arcade the company made merry with refreshments and gossip until at last the rain, disappointed at being unable to mar the sport, retired and left us unmolested for the rest of the meeting.

Friday, August 24th.

THE DEMONSTRATIONS.

DURING the business hours of Friday demonstrations and clinics were held in the surgery museum of the school of physic. Some of the most interesting of these exhibitions defy description, for the simple reason that manipulative dexterity cannot be conveyed in words; if, therefore, we do not attempt a detailed account of this department it is because we cannot do justice to it. Those who wish to know what the various demonstrators can achieve with their electric mallet accumulators (which, by the way, is not a happily chosen name, meaning strictly an instrument for accumulating electric mallets), their smooth-ended pluggers—how history repeats itself, this was the fashion here some five-and-twenty or thirty years ago—and all the other "dodges" and "tips" or "wrinkles," that ingenuity can devise and skill can practise; those who would fain know these things must attend the meetings and go to the demonstrations. An account of a demonstration is always a tame business, because in each case over and above all the mechanical contrivances, the individual skill of the operator really gives the charm to the peformance, the "personal equation" is the great thing, and that cannot be described. The room was arranged in a most perfect manner, and here we must pay a word of tribute to the chairman of the demonstration committee, Mr. Robert Hazelton, and his able and untiring henchman, Dr. Theodore Stack. Under the auspices of Mr. Hazelton and Dr. Stack the convenience of operator, patient, and spectator were all considered, each chair was penned in with a wooden railing, so that not only did the operator have elbow room, but the patient

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had air to breathe and the onlookers had a better chance of seeing. We shall hope to obtain from some of the demonstrators some illustrated details of their work in their own words for future publication.

A carriage excursion for the ladies of the party left the School of Physic at 10 a.m. to visit the Botanic Gardens, Glasnevin, once the residence of Addison; drive through the Phœnix Park to Knockmaroon Hill, the Strawberry Beds, and the Valley of the Liffey to Leixlip, returning in time for luncheon at Trinity College.

Annual Meeting of the Benevolent Fund.

At half-past twelve o'clock, the public proceedings of the Association commenced with the holding of the annual meeting in aid of the Benevolent Fund, in the Anatomy Theatre of the School of Physic, Trinity College.

The chair was taken by the President, Mr. CORBETT.

Mr. G. W. PARKINSON, Hon. Secretary of the Fund, in the absence of the Treasurer, read the report of the latter, as follows:—

GENTLEMEN,—As is usual at the annual meeting of the British Dental Association, I have much pleasure in making my report of the Benevolent Fund of the Association. You have been informed from time to time in the Journal and at the quarterly meetings, of the work and progress of the Benevolent Fund; but it is usual, and I think most desirable, that once a year the statement of the year's work should be focussed, that so a more exact idea of its position should be realised. Besides the balance sheet, which is the outcome of the very arduous work my brother-in-law, Mr. George Tawse, kindly undertakes in keeping our books straight, he has this year constructed a table of the receipts and expenditure of the Fund from its commencement, and from it you will see that our subscriptions and donations have steadily increased since the formation of the Fund in 1884, with the exception of the subscriptions for the year ending June 30th last, which have fallen short of the amount received during the previous year. A special effort has been made to increase the invested capital to £1,000 as a Jubilee memorial, and

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this, as you will see, has been accomplished. This progress is, I think, most encouraging, as it shows that the members of our profession in their prosperity are thinking more of their less fortunate brethren in their adversity. You will also see that the committee of management have at once availed themselves of the increased income to relieve cases of need brought under their notice. You do not, however, see the care that is taken by our indefatigable and able secretary, Mr. George W. Parkinson, in investigating the cases to ascertain if they are worthy of our help before it is bestowed. But I must proceed to details. Our receipts from all sources for the year ending June 30th of this year amounted to £426 1s. 11d. This sum was made up thus—donations, £159 5s.; subscriptions, £242 19s., and interest from investments, £23 17s. 11d. Besides these receipts we had in hand at the commencement of the year £235 8s. 5d., making a grand total for the year of £661 10s. 4d. This amount has been dealt with in the following manner:—£135 10s. has been invested, to make up our capital to £1,000 in round numbers, £259 1s. 5d. has been expended in allowances, education, &c., being £78 9s. 7d. more than was so expended in the previous year. Printing and stationery cost £4 19s., and postages and miscellaneous items £8 2s. 7d. We have £246 4s. 10d. in the bank in our current account, and £7 12s. 6d. in the hands of the secretary. From this sum the outgoings of the rest of the year have to be paid, for we have many children on our hands for education, whose quarterly bills have to be paid. Our income for the year ending June 30th last was £56 15s. 7d. greater than that of the previous year, the amounts being £369 6s. 4d. to June 30th, 1887, and £426 1s. 11d. to the same date this year; but unfortunately this increase is chiefly due to the Jubilee donations as mentioned above. The fact is that new subscriptions are coming in very slowly, and are hardly keeping pace with the loss of subscriptions discontinued. As will be seen by the statement of our income, our means of helping those applying to us in their need depends almost entirely on our subscriptions, and if these do not increase, the fresh cases of distress that come before us will have to be refused assistance. According to our laws, all donations of £5 and upwards must be invested. Therefore, as I have just said, it is to the subscriptions we must look for our available funds for helping those who apply to us. The subscriptions for the year ending June 30th, 1887, amounted to £267 17s., and those for the last year were £242 19s.; while the expenditure for the past

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BENEVOLENT FUND OF THE BRITISH DENTAL ASSOCIATION.

Dr. BALANCE SHEET AS AT JUNE 30TH, 1888. **Cr.**

Donations					£159	5	0	Benevolent Allowances			£259	1	5
Subscriptions—1886 ...	£0	10	6					Postages and Miscellaneous			8	2	7
„ 1887 ...	74	8	0					Printing			4	19	0
„ 1888 ...	168	0	6					Investment of Capital *			135	10	0
				242	19	0		* £1092 14 4 of 2½ % Consols, costing £998 15s., held at June 30th, 1888.					
Interest on Investments				23	17	11		Cash in Bank of England at June 30th, 1888	£246	4	10		
Cash in Bank of England at July 1st, 1887	210	13	4					Cash in hands of Secretary at June 30th, 1888	7	12	6		
Cash in hands of Secretary at July 1st, 1887	24	15	1									253	17	4
				235	8	5							
				£661	10	4					£661	10	4

August 9th, 1888.—We have examined the Books of the Benevolent Fund of the British Dental Association with the Vouchers, and hereby certify the above Balance Sheet to be correct.

(Signed) W. F. FORSYTH, ASHLEY GIBBINGS, } *Auditors.*

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RECEIPTS.

	Year to June 30, 1888	Year to June 30, 1887	Year to June 30, 1886	To June, 1885	To December, 1884	Totals.
Donations	£159 5 0	£81 5 4	£55 0 6	£25 3 6	£692 11 6	£1013 5 10
Subscriptions	242 19 0	267 17 0	196 13 6	132 19 0	173 11 6	1014 0 0
Dividends	23 17 11	20 4 0	25 18 11			70 0 10
	£426 1 11	£369 6 4	£277 12 11	£158 2 6	£866 3 0	£2097 6 8

EXPENDITURE.

Benevolent Allowances	£259 1 5	£180 11 10	£149 11 9	£64 6 4	£91 16 0	£745 7 4
Investment of Capital	135 10 0	100 0 0	149 15 0	114 5 0	499 5 0	998 15 0
Postages and Miscellaneous	8 2 7	4 9 6	3 8 10	1 6 6	9 17 5	27 4 10
Printing	4 19 0	1 5 6	26 9 0		39 8 8	72 2 2
	£407 13 0	£286 6 10	£329 4 7	£179 17 10	£640 7 1	£1843 9 4
Cash in Bank and in Hand ...						253 17 4
						£2097 6 8

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year was £272 3s., being £29 4s. in excess of the amount received from subscriptions during that period.

I have thus given you but a bare statement of figures representing our financial position, which is, indeed, my province. I must leave it to our honorary secretary to give you some details of the cases we are assisting, which, though more interesting, are too often very sad; but, gentlemen, you have the pleasure of knowing that by subscribing to the Benevolent Fund you are conferring benefits on very many who, without such aid, must go to the workhouse, and grow up without suitable education; whereas by your assistance, many a child of a dentist will now be enabled to take a position in the world which otherwise it could not have attained.

I am, Gentlemen, yours faithfully,

A. J. WOODHOUSE.

Treasurer.

On the motion of Mr. ROGERS, seconded by Mr. W. BOOTH-PEARSALL, the report was unanimously adopted.

The PRESIDENT: Preliminary to any observations that I may make on the subject of the Fund, I shall give practical effect to my sentiments by handing in a donation (£10).

Mr. PARKINSON read the following report of the Committee of Management of the Benevolent Fund:—

Your Committee beg to submit to the contributors of the Benevolent Fund of the British Dental Association their fifth annual Report.

The Honorary Treasurer's annual financial statement, duly examined and certified, extends from the foundation of the Fund in 1883 to the end of the present financial year, June 30th, 1888.

The general business brought before your Committee during the last year has not been so numerous comparatively with past years. The number of children being educated at the expense of the Fund is now thirteen, this is an increase of two on the number last year. The eleven children accounted for in last year's report are all well and happy, and your Committee have deemed it advisable to keep them at school for another year, and sincerely trust that the funds will permit of their being educated and maintained for a still longer period. It has been found necessary to remove two children from one school and place them at another at the same annual expense, the school these children were at being found unsatisfactory in several respects.

Your Committee have also considered it advisable in one case

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to allow a boy who was being educated and boarded to be removed to a day school in the same town, the mother being allowed the difference of expense between the two schools for the maintenance of the child at home, the cause of its removal being ill-health and the necessity of a mother's care and supervision, which she is now able to give—this arrangement has been found to work very satisfactorily, the child and mother both being happier, and the former in better health than under the old arrangement

Your Committee have only received an application from one widow for relief, and she has been helped in a way that will considerably help her to maintain herself in the future; her case was a very sad one, and your Committee had to strain a point in her case, as in reality she was not a widow, but her husband, a member of the profession, is now, and likely to remain, a helpless lunatic; she was totally unprovided for, and has several young children, for whom your Committee would have, had the funds permitted, placed at schools, as it is a most deserving case.

Your Committee have had no application from dentists during the past year, with one exception, that from an unregistered practitioner, which, according to the rules of the Fund, could not be considered.

Your Committee deeply regret that in addition to the cases already enumerated, they have had to refuse the application from two orphans, on account of there being no adequate funds to grant them any permanent relief, and for this, and other reasons, your Committee most earnestly appeal to the profession and other friends for more annual subscribers and donors, so as to enable them to relieve these cases in a permanent way when they arise, and not to exercise the disagreeable, and, in some cases, heart-rending duty of refusing their appeals.

In accordance with rule 20, this annual report is now offered for your approval and acceptance, and a list of contributors has been prepared, and is now open to your inspection prior to publication.

In conclusion, the best thanks of the Association are due to the auditors, Messrs. W. F. Forsyth and Ashley Gibbings, for their kindness in again auditing the accounts (no light duty), and also to Mr. George Tawse for his generosity and professional skill in gratuitously preparing the balance sheet which is now presented for your approval.

On the motion of Mr. Brownlie (Glasgow), seconded by Mr. Kluht (London), the report was adopted unanimously.

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Mr. Browne-Mason (Exeter) mentioned an exceedingly sad case which came under his notice while he happened to be in Devonshire. It was that of a widow who was left with four children to educate, and who was entirely helpless and without friends. He knew that it would be of no use to ask for assistance from the Fund, and therefore he made a personal appeal to friends in the locality who were members of the profession, the result of which was such as to enable him to give very material help in the quarter needed. He mentioned this in order that members might know that all the cases that required help did not come to the Secretary's knowledge. They ought really to support the Fund more heartily than they did, and it was with very sincere regret that he learned that the annual subscriptions, on which their income mainly depended, had in a measure fallen off. He hoped that the present successful meeting would be the means of resuscitating the Fund and putting it on a good footing once more. What they wanted was to get subscriptions from those who had hitherto held aloof; his present remarks did not apply to those who had already helped them. In the case to which he had alluded, by dint of the help obtained from professional friends and outsiders they were enabled to set the widow up with a lodging-house.

Mr. Dennant alluded to the bye-law which required each member of the Committee of the Fund who had completed a period of three years' service to retire. Having worked on the Committee himself for six years, he saw distinctly that great advantages resulted from continuity of membership. It was necessary that the men who had a Fund to administer should have their work, and the persons with whom they had to deal, at their fingers' ends. Frequent changes of members on a committee of this kind were rather an evil, and he hoped the Association would see its way to allowing the committee man who had served three years to serve the following year. Of course he need not do so; but it was a mistake to require him to retire. If the bye-law on the subject could not be altered now of course it could be next year.

Mr. S. J. Hutchinson (London) said that as a member of the Committee of Management he thought a few words of explanation were due as to the failure to a certain extent of the funds to meet the deserving case to which Mr. Browne-Mason had alluded. That was a special case in which a large amount of money was required; and it was greatly due to Mr. Browne-Mason that that

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large amount was collected. But he (Mr. Hutchinson), wanted to point out that a very small sum devoted to the education of a child did an immense amount of good. They had in schools in different parts of the country, as Mr. Parkinson had pointed out, twelve or fourteen children who were being educated at an average expense of £22 a year each. So that by the subscriptions they got from members of the Association they could do an immense amount of good by not only educating but also boarding and lodging children for sums of from £20 to £22 a year. His feeling had been rather in favour of educating and providing for children than of extending help to the parents except where, from physical infirmity, they were unable to help themselves. The fund in question was one purely for the purposes of benevolence. It was in no sense a provident fund; and they felt that the charitable intentions of the subscribers were best realised by employing the fund as one of pure benevolence and kindness.

Mr. DENNANT said the British Medical Association was fifty-six years old, whilst that Association was but nine years old. He would be the last to throw extra pressure on too willing volunteers. A provident fund could only be administered on a basis of actuarial exactness, and with the assistance of experts. He was of opinion that they should content themselves with having their Fund a benevolent fund. He looked forward to the time when some of their younger and more energetic men might see their way clearly to the establishment of a provident fund in connection with the British Dental Association; but at present he did not think such a thing would be practicable.

Mr. PEARSALL said the Provident Fund established in connection with the British Medical Association was only four or five years old. The only way in which such a fund could be got up in connection with the Dental Association would be by the subcriptions of a large number of members; and every Dental Licentiate would be entitled to go upon it. Again, according to the reports of Mr. Ernest Hart, an enormous number of accidents happened to medical men, who, but for those accidents, would not want such assistance at all. There were several cases of medical men who had been incapacitated by severe accidents from work and who had got pensions from the British Medical Fund. They must, however, have subscribed to the fund for a year, or they would not have been entitled to pensions. But the British Medical Association Provident Fund had worked most

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splendidly; it had some £25,000 or £30,000 invested; and every member of the profession holding the degree of L.D.S. was interested in it. It was like a life insurance society and was managed by voluntary work. The expenses were reduced by the voluntary assistance of medical men all over the country in examining candidates and so on. The actuarial tables were calculated on the assumption of a loss of 5 per cent, for working; but the actual cost of working was only 3½ per cent. In addition to the money invested they had a sum to put by as a reserve fund.

The PRESIDENT said he understood the intention of the Benevolent Fund of the British Dental Association to be the relief of immediate necessity. A small fund, adequate to dealing with urgent cases was sufficient for their purposes; and he did not see any necessity for accumulation. When money was wanted he would have great reliance on the good nature of his fellow-practitioners; and if sheer necessity should be the motive principle of the appeal, there would be a more ready response than if it were known that there was a large fund invested. In the latter case the reply would naturally be, "Draw upon your reserve, I cannot afford to contribute." Therefore they should be content with a moderate investment, and they should be correspondingly generous to those who applied to them in their dire necessity. The members of the Association were not in the same position as medical men at all. The latter were more liable to casualties than they were, and every one of them could from his resources put by something for a rainy day. It was his experience that the more urgent the case of necessity was, the more willing were members of that profession to respond to any appeal made to them in a proper spirit.

Mr. PARKINSON: I have much pleasure in telling you that the result of the appeal made by the cards last night was the collection of £50. The President also, had just presented us with a cheque for £10.

Mr. MACLEOD said the Art Union of pictures in aid of the Benevolent Fund had been successful to a certain extent, but not nearly so successful as it ought to have been. The value of the pictures to be drawn for was £70, but up to the present they had only received £29 2s. 6d.

Several members intimated their intention of taking tickets.

The meeting then adjourned for luncheon.

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After luncheon on Friday the reading and discussion of papers was proceeded with in the Anatomy theatre.

The Use of Imagination in the Construction and Design of Artificial Teeth.

By W. BOOTH PEARSALL, F.R.C.S.I., M.R.I.A.

During the past twenty years operative dexterity as opposed to mechanical ability has made so much progress, especially in methods of restoring the forms of diseased teeth or roots, and the younger members of our profession have had the importance of mere operative skill so strongly impressed on their attention, as well as their professional ambition, that it seems as if mechanical dentistry as an art is in danger of falling into undeserved neglect. Some members of our profession are sanguine enough to believe that mechanical dentistry will become obsolete in the immediate future that now awaits operative dentistry. Be this belief right or wrong, I think all of us who carry on a mixed practice, partly operative, partly mechanical, are agreed that a large number of cases still present themselves to us for advice how best to obtain mechanical appliances for restoring losses of teeth from disease or accident, that cannot be dealt with by the newer modes of operative procedure, that even yet can hardly be considered to have developed beyond the experimental stage, and become certainties if performed by average operators. It is with respect to the more artistic and judicious treatment of this large class of patients that I wish to invite your attention, in the hope that the mechanical training in design and construction may be directed into the safe and experienced school of the men who are passing away and have done good service in their generation. There is no limit to the avenues that are open for the employment of human skill and invention, each generation brings its own needs, which have to be supplied in various directions, and I have little doubt if we all had a constant supply of patients en-

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dowed with unlimited endurance, both physical and financial, as well as an inexhaustible belief in our inventive and manipulative powers, certain modern experiments of a quasi mechanical character could be developed *ad infinitum*, so long as we are contented to treat them as mere exhibitions of skill suitable for display in the proverbial glass case, while they possess no practical advantage over older and more certain methods of work in dealing with the dental problems I speak of. As I have said, some of our pessimistic brethren consider that excellence in mechanical dentistry has been on the wane for some years, and the credit of this baneful state of things has been credited to the unsuitable employment of vulcanite. I venture to think, however, that in the selection of the various materials modern science has placed at our disposal, a dentist can still show skill and inventive qualities of a high order, whether it be in gold or in vulcanite, or the now fashionable continuous gum work, which has hardly become more than a decoration to mechanical work as yet.

I am at a loss to understand why mechanical skill should degenerate, as I am of opinion that a well-designed and comfortable denture, fulfilling the objects of its being, does a dentist as much credit as a practitioner as an elaborate gold or porcelain contour filling that may be lost to the patient from a simple cold, setting up periodontitis in the socket, such as even the wonderful advances now seen in operative treatment may not be able successfully to subdue. From some years' observation there is, I regret to say, a far greater proportion of badly designed and inartistic work produced than might seem warranted, when we remember how energetically the dental schools have been carried on for the past twenty years or so, and it is with a view of rousing my younger brethren to take a more hearty and personal interest in their workrooms and mechanical processes with artistic aims, that I venture to speak to you on this subject.

In constructing or designing artificial teeth, one of the safest rules the conscientious practitioner can take to heart is that embodied in the *argumentum ad hominum*—would he like to wear it himself? And I am thoroughly convinced that many professional pitfalls are brought about by the too frequent habit of studying the plaister model rather than the patient. Attention is more frequently directed to the solution of the mechanical problem on the model rather than to the book of nature. I would therefore earnestly urge the cultivation of a habit of endeavouring to picture

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or imagine in your mind the nature of the appliance you purpose to supply to your patient with all the details so distinct and real that you could make a drawing from them or model them if you wished before you even placed the impression tray in the patient's mouth; and it is the use of this precious gift of imagination that enables the users of it to shine in poetry, painting, literature, and all the inventive arts and sciences. I dare say some of my hearers may ask how can you advantageously use imagination in the construction of so prosaic a work as a denture to supply missing teeth?

In the first place, as you examine the patient you should be able to picture in your mind the original condition of the mouth; you ought to be able to determine how far the muscular action of the cheeks and mouth will affect the stability of your work; you ought to be able to determine the amount of pressure the patient can bear in mastication, and possibly be able by judicious observation to avoid the pressure spots so frequently produced by ill-designed work on moveable surfaces in the mouth. You should be able to determine when it would be best to thicken or reduce the bulk of the work, so that in cases of great disfigurement from loss of support caused by absorption of the alveolus, you can determine how best to restore the natural action and expression of the mouth, not only by study of the profile but also of the parts as seen in elevation. Here is a field in which to show you are both a dentist and an artist. You neither distort nor disfigure whatever expression your patient possesses. You can repair the ravages which disease and decay have made in the most mobile and expressive features of the face, and not only restore the functions of speech and mastication, but also that of natural and artistic expression.

The points I would dwell upon as likely to lead to an artistic result in the construction of artificial teeth is a careful study of the natural expression of the mouth, by making experiments with suitably moulded wax try plates; the careful selection of suitable teeth, in harmony, in form and colour with the face and mouth of the patient, and the correct centering of the teeth when set up or mounted, not by rule but by direct observation; not altogether according to taste, as the cookery books say, adopting a bold style or the reverse, but rather by the careful noticing of the characteristics of each case with which you have to deal. The careful and deliberate trying in of the work during the different stages of its

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progress often affords most valuable hints, not only from the point of view of your own experience but that of your patient; and I confess to enjoying the criticism at this part of my work, of an intelligent patient, correcting the deficiencies of the model or preserving its excellencies. Last, but not least, is the painstaking adjustment of the denture in the patient's mouth after it has been continuously warm for twenty-four hours, carefully noting the friction spots on the mucous membrane as well as on the plate, and paring or dressing away those on the teeth with a scholarly perception of their relative importance, as well as careful fine fitting of the articulation after the patient has had at least forty-eight hours' experience in the use of your appliance.

How does it happen that some practitioners, the sittings necessary for the construction of a denture over, are seldom required after its completion to see their patients more than two or three times, and then only for some trifling adjustment of the bite or some friction spot on the gum; while other practitioners who are just as skilful *as workmen*, keep their patients in prolonged and unnecessary discomfort for days or weeks after the case is finished? In the first place, the battle of difficulty has been fought and won by the dentist before his work was worn by the patient; in the second case, careless or inaccurate models may be the cause, or the design of the case has been left to an assistant who has almost certainly never seen the mouth, the lamentable result often brought about by the neglect to make proper observations at sittings given by the patient for the purpose for trying in. If it takes a master of his art, like Sir John Millais, from sixty to seventy sittings to produce a portrait, do you think the average dentist ought to neglect to give the same deliberate care to his work? Want of power to design, in other words, the power to imagine how a case ought to look when finished, is in my opinion one of the greatest defects a dentist can be afflicted with. How often do we see cases in which the workmanship and finish are worthy of all praise as well as a place in a museum, but lack the life-giving quality of design, looking a model of skill anywhere but where it is intended to be seen—in the patient's mouth. An extreme observance of mechanical symmetry in the position of the teeth, is a frequent characteristic of the work of many practitioners, and I do not think I am unduly ironical, when I confess that I am irresistibly reminded of the keyboard of a piano or the dentations in the string course

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of a classic building. Now we ought to remember that nature abhors mechanical symmetry, and the keyboard style of denture, no matter how beautifully it may be constructed or finished, can never be called artistic or prosthetic as naturalness of appearance is altogether ignored, and the patient's expression, when we observe it in repose or in animation, shews that a startling and inappropriate experiment in decoration has been carried out in the restoration of the lost organs.

I think I have sufficiently dwelt on the use of imagination in our important work; and what am I to say about that of the manufacturers who supply us with the artificial teeth we have to use in effecting restorations from injury or disease. We all admit that wonderful advances have been made since our President first began his half century of dental work, in the quality of the teeth now supplied both in colour and translucency. Have the manufacturers progressed in the direction of design and fitness of form as much as we have a right to expect from the close study that has been given to the forms of natural teeth during the past twenty years? Is the manufacture as perfect as we are so emphatically assured by these gentlemen? I say no. I have only to draw your attention to certain features in the manufacture to explode this untenable position. That there are serious defects and mannerisms in the moulds still used by our manufacturers no one can deny. Types of teeth (wonderful for the standard required forty years ago) are still manufactured in large quantities, with the further defect that the modern descendants do not possess the sterling qualities of naturalness of shading and indestructibility of the earlier teeth, the modern tubes for instance being much more easily ground and broken than was the case thirty years ago, nor are the same pains taken in the shading of the enamel surfaces of the incisor teeth of this make now-a-days.

Another serious defect is the want of rhomboidal form in molars as well as the smallness of size, making it difficult for us to go as far as we might imitating the natural method of articulation, for even in the elaborate upper and lower sets, including the molars and bicuspids, will not make any approach towards natural articulation, no matter how carefully they are set up. Then we come to the exaggerated rounding of the approximal surfaces of the artificial teeth, particularly the incisors and bicuspids, so that valuable time has to be spent in grinding away material that could be saved from waste by the manufacturer, if only the moulds were more naturally

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modelled. I need not dwell upon the exaggerated tables of the enamel surfaces of the upper and lower incisor teeth bearing little or no resemblance to the natural teeth; this is a defect I am astonished has not been remedied, although I am sure manufacturers have often been reminded of it, as well as the ridiculous habit of providing for elderly people the cutting edges of the teeth as seen in youth, while the long surfaces of the exposed roots are invariably omitted, or so badly modelled and coloured as to be laughable, as a practical attempt to reproduce nature. Latterly a baneful vice has sprung up in the manufacture of teeth, of creasing the enamel of the incisor teeth with grooves of mechanical regularity across the tooth, or in the direction of its length; so symmetrical is this creasing as to give an unmistakeable artificial look. With this defect in view, I beg of you to look at the bone work in the museum, for even in examples where the work has been mechanically executed, the teeth being of different curves and shapes on their surfaces, hardly two of them alike, they, of course, look far more natural than our artificial teeth artistically mounted. I have been told by manufacturers that the profession will only buy certain goods and certain sizes. To this I answer, that there are numbers of artistic dentists who *will* pay for better goods, if only the manufacturers will place them in our hands.

In saddle back and other vulcanite teeth, the breaking strains of the teeth are not considered in their design as they ought to be, and very little observation and experiment would remedy this defect.

It has often been a matter of surprise to me that metal teeth have not been made for use as molars in edentulous lowers. They would help to ballast the case in a very convenient way, and would, I think, make less noise in use than the porcelain teeth. My friend Mr. Kirby, of Bedford, makes metal blocks for such purposes, that are admirably designed for ballasting and noise saving. Why cannot the manufacturers turn them out for us ready made, as the trouble would be trifling for a large number, as they could be punched or stamped in presses by cheap labour?

I would urge the use of visiting picture exhibitions and carefully studying the various phases of expression in painting and sculpture, as we see it developed by the minds and hands of our great artists. It is invaluable to us all as a stimulus in our art.

In conclusion, I have to thank you, gentlemen, for your patience and attention, and I hope in the discussion you will support my

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contention, that artistic mechanical dentistry is well worthy serious attention.

The PRESIDENT said Mr. Pearsall's paper might not provoke much discussion because they were so unanimous about it. He regretted that the manufacturers, upon whose skill and dexterity and inventive genius they relied so much, were not present. He hoped that they would be moved to a practical result when they read Mr. Pearsall's paper.

Mr. BROWNE-MASON said that if a few members would express their feelings as to the necessity of getting decently shaped teeth, perhaps it would spur the manufacturers to supply them. The want had been felt for many years; and deficiency in the size of molars and bicuspids had also been a fault. If the manufacturers were asked why it was they did not make rhomboidal molars of a decent size, approximating to adult size, their invariable answer was that they could not sell them. If a declaration went forth from that meeting that these undersized teeth were practically useless, it might lead to beneficial results.

Mr. BALKWILL said it should be remembered that the natural organs were implanted in a different manner from those that were supplied. Many years ago he (Mr. Balkwill) wrote on this subject, and pointed out to the manufacturers the desirability of their producing rhomboidal molars, with a better shape than the teeth they were producing. Molars of that description had been from time to time made. He must confess, however, that a quantity of rhomboid-shaped molars which he bought ten or a dozen years ago were on his hands still. He did not think he had used more than one or two sets of them. He was afraid there was some practical difficulty connected with them, that they were not so easy to work with as the others.

Mr. J. SMITH TURNER (London), said they were now discussing the artistic shape of teeth. A few years ago Messrs. Lemale brought out a quantity of teeth of the most beautifully natural shape that could be desired. But the objection was found to them that owing to the narrowness of the neck they showed too much of the rubber in which they were set; and, furthermore, when they were set in the palate there were spaces between them. Those spaces, although they looked very natural, sometimes gave rise to inconvenience by the air slipping through the necks of the teeth and causing a whistling sound. Again,

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when teeth used to be mounted in plates—as was within the memory of some of the older members of the Association—the teeth were secured in the approximating surfaces and made to fit against each other, and by that means the accumulation of particles of food in crevices was excluded. But now it was one of the objections to the use of natural-shaped teeth, that an accumulation of food took place in the spaces, and it was not always convenient for the individual to remove the teeth and cleanse them. The result was a process of decomposition of the food particles and a disagreeable taste in the mouth, and where people who were not particular about the matter retained these teeth in their mouths without constantly taking them out and cleansing them, their breath became offensive. He thought that that was what brought about the present shape of artificial mineral teeth. Dentists used formerly to make teeth of the natural shape, but that practice was abandoned and the more formal shape adopted for the reasons he specified. The difficulty appeared to exist still. One great advantage attendant upon the use of mineral teeth was that the glaze was embedded in the body of the tooth, and the grain of the material was so close that the tooth might be cut to any shape that was required and polished afterwards. This he found he could do with incisor teeth of the description he mentioned. Another point was that in well-developed natural teeth the width of the canine, at its widest part, was nearly on a par with the width of the incisor at its cutting edge. In the teeth supplied from the depots the canines were smaller, and in nine cases out of ten he had to select canines of a size larger than the rest of the set in consequence of that defect.

Mr. G. M. P. Murray (Dublin), remarked that in the designing of dentures a great deal of courage was required to model them in accordance with the lost tissues. Not merely had the lost tooth to be supplied, but also the alveolar process that was lost by absorption. The scientific study of a normal set of teeth in a well-formed jaw was of great assistance. It would generally be found that, in the case of the Caucasian higher races, although the axis of the front teeth was in a plane forwards and slightly upwards, the anterior enamelled surface looked forward and slightly downwards. The cutting edges of artificial front teeth might be in a right position, but if the necks were too far over it would require a great deal of boldness to model the tooth of sufficient thickness above the neck to restore the proper contour. Another defect was that

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the lip was allowed to fall in where it needed support under the nostrils, and the edge of the former was drawn across the teeth, giving a prominent appearance, though one tooth might not really be more prominent than another.

Mr. Amos Kirby (Bedford) said he could confirm what Mr. Turner had just said. The great point in procuring a natural appearance in artificial teeth, was to get a right shape to the edge. The canine teeth supplied to them bore very little resemblance to the form of the natural teeth. The occasions on which individuals showed the upper parts of the teeth were very rare, and if the rest of the tooth were made in a good form, the arch of the upper part of it following as closely as possible the natural form of the arch, a better appearance and effect would be attained than if teeth of a flatter form were used.

Mr. Balkwill remarked that an advantage might be very often gained by putting in canine teeth a shade darker than the others.

Mr. Pearsall in reply said, they had not asked the manufacturers to reduce their prices, and he would be very happy to go back to the old-fashioned prices of thirty years ago, provided he got the sort of teeth he wanted. He believed the makers would find no difficulty in getting reasonable prices for a good article. He admitted that some modification of the natural forms might be necessary. The purpose of teeth was a matter that should be taken into consideration as well as their design and form; but he was sure that if dentists came together in consultation on the subject, they might arrive at very important results and might induce the manufacturers to adopt their suggestions. Mr. Turner's remark as to the narrowing of the roots could be easily met by judicious modelling. In his opinion, the root could be easily modelled down, for the enamel surface of the teeth as at present made were twice as long as those of nature. The modelling of contours required a great deal of judgment. It should be done to suit each case, by direct observation, and not merely in accordance with rule, and a certain amount of taste should guide the worker. One thing, as to which he was sorry that no one had supported him, was the necessity for making allowance, in contours, for the pressure that was exerted on the mucous membranes. It was often forgotten that the jaw was moved by very powerful muscles, the pressure in foot-pounds being very considerable; and many men in designing a denture left sharp thin edges to the denture, with a result that might be satisfactory

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in the working room, but did not recommend itself to the patient. For many years it had been his practice and that of his father to make very thick edges to the dentures, and to leave hollows below the molar teeth in lowers, accommodating the patient's tongue.

The PRESIDENT called on Mr. Fisher to finish his observations in reference to the making of attention to the teeth of school children compulsory.

Mr. FISHER said that though he had used the word "compulsory," the application of compulsion was at present a matter in abeyance. All he wanted at present was that the Association should authorise the sending of books to the Presidents of the branches, with a view to the collection and tabulation of returns from all the schools, parochial, industrial, training ships, reformatory and orphan. For that purpose an expenditure of about £10 would suffice.

Mr. TURNER: The matter might well be left in the hands of the Representative Board.

On the motion of Mr. HUTCHINSON, seconded by Mr. TURNER, it was ordered that the matter should be left in the hands of the Representative Board.

Section IV. of the Annual Museum and its Contents.

BY G. M. P. MURRAY, Dublin.

MR. PRESIDENT AND GENTLEMEN,—I feel at the outset that I owe you an apology, having failed to comply with the rules of the Association which require the submission of all papers to the Central Committee some time before the annual meeting, and the placing in the hands of members an abstract of the line of discussion to be adopted, and the principal points raised.

To the courtesy of Mr. Morton Smale, before whom I laid my case, I owe the permission of the Committee to read in this irregular manner, these few remarks on Section IV. of the Annual Museum and its Contents.

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Many of you have heard of the conscientious zoologist, who, deeming his treatise on the fauna of the British Islands incomplete without a chapter on "The Snakes of Ireland," found his remarks on the subject limited to the bald statement "There are no snakes in Ireland." Even so, I, up to a short time ago, feared that the gist of my paper would be to the effect that there were no contents in Section IV.

However, certain kind friends, foremost amongst whom I must mention Mr. Brunton, of Leeds, and our own energetic secretary, Mr. W. Booth-Pearsall, rallied to my support, and have placed at my disposal sufficient material from which to point a moral, if not to adorn a tale.

Some years ago a man of private means and no occupation, paying a visit to my father's workroom, and observing the various phases of work incidental to the conduct of a busy practice, delivered himself of the somewhat bold assertion that he would undertake to master the intricacies of mechanical dentistry in three days. To whom my father replied that it had taken him ten times that number of years to gather what little he then knew of the subject, and that he hoped that as long as he continued to work, so long would he continue to learn.

But in those days every man had to learn from his own experience, and did not enjoy, as we do, the advantage of annual meetings of the British Dental Association, affording opportunities to the erudite, skilful and ingenious, to impart of their ample store to those less favoured brethren, who are willing and anxious to increase their knowledge; and to those who have eyes to see, the mute testimony of the objects in our Annual Museum is capable of affording a liberal education, showing as they do, the steady progress begotten of increased knowledge, and an inventive genius, ever active, ever restless.

The lessons to be learned from the unique collection of ancient and modern dentures in the adjoining room, will amply repay thoughtful study. There are to be found specimens ranging from the archaic "bone age" of dentistry through the sets of natural teeth obtained from the dissecting room and the body snatcher, the early home-made mineral teeth, the old silver and gold plates, the more modern vulcanite, that filthy and disgusting compound, celluloid, to the later developments of cheoplastic and continuous gum work.

The progress of mechanical dentistry may be doubted by those

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who hold that the dreary legend "Ichabod" might well be graven upon a cenotaph of vulcanite raised to the memory of that lost art; but few will be found failing to recognise what has been done in the development of extracting instruments, who have the courage to go through that chamber of horrors, contained in the cases adjoining the ancient dentures. Here are to be seen such blood-curdling weapons, as we might imagine wielded by the bony claws of the Apothecary in "Romeo and Juliet." Indeed, sir, we had some hope of showing the original leaden forceps, said to have been deposited by Galen in the Temple of Æsculapius, had not our negotiation with the enterprising Birmingham firm from whom we were to have obtained the priceless relic fallen through.

Will any one dare to compute the aggregate amount of agony inflicted by these grim monsters of a byegone age, the punches, keys, and early forceps now lying so innocently in their wooden cases. Retributive justice has overtaken them, their teeth are drawn, and they are condemned to an old age of coldness and neglect, supplanted by the beautifully designed instruments which we regard as a necessity of our every day lives.

He was a wise man of old who attributed human happiness to the possession of a healthy mind in a healthy body. Might not we make practical application of this truth, and realise that a healthy man in a healthy workroom will do more and better work than can be produced under adverse circumstances. The workroom section contains what I may call a suite of workroom furniture, whose hygienic principles should commend them to those who toil at the bench, or are careful for those whom they employ.

A man of literary pursuits, who spends long hours in writing, will have a desk at which he can stand while working, and so relieve his muscles and expand his chest by change of position. The artist will stand at his easel and the artisan at his labour. Why then should he who is employed at the minute and absorbing work of mechanical dentistry, be condemned to sit with contracted chest and bowed shoulders, a position which is necessitated by most of our workroom benches?

The high bench, shown in Section IV. conveys a practical hint to those anxious to improve the conditions under which they work. I would also draw attention to the proposed arrangement of tools under the bench, and ready to the hand of the operator, while the space usually littered with files, pliers, sculptors, &c., is left clear and open for the work in hand. What ingeniously devised dust-

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traps most of us have arranged round our workroom walls, where the models of succeeding decades lie stored on narrow shelves, gathering continually dust, dust, and still dust; which, though innocent looking enough in its ever deepening repose, might not come with unblemished reputation through the searching ordeal of a miscroscopic examination. A strongly made, serviceable model-cabinet, such as may be seen outside, besides its convenience for reference, would do much to improve the atmosphere of our rooms. The lathe, with its powerful driving wheel and leather band, which will be found set up upon the bench, will repay study and reflection, and I would draw attention to the ingenious use to which old polishing brushes are put, to moisten and keep clean the corundum wheels, and prevent splashing.

Of all workroom materials, probably the most important and indispensable is plaster of Paris, and some specimens of great interest will be found upon the workroom bench, lent by Mr. J. Walker, of London. These show the different results obtained by mixing plaster in different ways, and being cast in earthen pots, one can readily judge of the varying amount of shrinkage under the different methods. I think it will be found that good fresh plaster mixed with clean cold water will set harder, and shrink less than if prepared in any other way. There are also to be seen wooden bins for the storage of plaster, for which it is claimed that the material keeps better and is more convenient to get at than in tins.

Many of these workroom appliances speak for themselves, and will at once appeal to those who have felt the wants and difficulties they are designed to meet, as, for instance the vice or clamp for holding zinc models while working up a plate. The advantages of the flasks for vulcanite and cheoplastic work are too apparent to need comment, and the ingenious articulator of Mr. Hele of Carlisle, simple in construction and effective in working, will commend itself to all.

Most operating dentists will acknowledge that amongst the most useful of appliances which inventive genius has given us, matrices take a high place. Indeed, I would place them in the very first rank, in the honoured company of the coffer dam, and the dental engine.

Mr. Brunton, of Leeds, shows us a complete set of these invaluable little allies, whose aid so often smooths out a difficult and complicated undertaking into plain and pleasant sailing. He also

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sends us an ingenious appliance for preparing gutta percha stoppings over hot water, by which one can obtain the exact degree of heat desired, without risk of injuring the material.

A very practical help to the operator, giving him the benefit of a third hand, is to be seen in the little finger-ring, cup and slab, in which stopping materials can be held close up to the scene of action during the operation, thus saving much time and permitting concentration of attention.

Two operating stools are also sent in for exhibition, one running on castors and attached to the wall by a jointed arm, and the other with a bicycle seat upon a rocking stand, and lest between these two stools we should come to the ground, the workroom seat can be also used beside the chair.

Great simplicity is the leading characteristic of the standard bracket, which will be seen in use in the demonstration room, where Dr. Yeates' bracket is also shown attached to the chair, rising and falling with it, and much lighter and more manageable than the heavy structures usually supplied.

I regret that we were unable to show in action the water motor invented by Mr. Smyth of Londonderry, but perhaps its mechanism can be better studied as it is. Employing the principle of the water-wheel, it requires but a low pressure, and is probably the smallest turbine ever applied to a practical purpose.

Most, if not all, of our appliances, tools, and instruments, have originated in the inventions of dentists to meet their own wants, and I cannot but think that these inventions would have been sooner developed and polished by the friction of friendly criticism and suggestion. Therefore it is that I hope our effort, made for the first time at this meeting, may be but the beginning of greater things, and that it may be said of many a brilliant invention of the future, that it first saw the light in Section IV. of the Annual Museum of the British Dental Association.

Mr. Ralph King made a few observations on the paper.

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Some Properties of Amalgams.

By AMOS KIRBY.

We are accustomed to think that the successful treatment of dental caries depends largely upon the exclusion of foreign matter from the cavity which results from the action of decay and from the removal of diseased tissue.

The perfect exclusion of moisture may not be essentially necessary, but it is a matter of common observation and consent, that the more perfectly the cavity is occupied by stopping material, the greater under similar conditions will be the prospect of success.

We are acquainted with very few substances which lend themselves to our purposes in a perfectly satisfactory manner, and amongst those that we are glad to employ, it is a matter of regret that amalgams with their many valuable properties are all of them subject to more or less serious defects. These defects can be lessened or overcome by methods which are now frequently used, but as the causes which lead to failure or success are not yet fully understood or recognised, it is evident that any facts which have a bearing upon the subject cannot be devoid of interest. I have therefore ventured to lay before this Association the results of some experiments which I have carried on at intervals for many years, down to the present time.

Some of them have been already mentioned, but as they have never been published in detail, I will (for the sake of clearness) take the liberty to describe as briefly as possible those which appear to have an important bearing upon our daily practice.

The first object was to discover whether dental amalgams were the subjects of expansion or contraction during the process of hardening, and it was found, that although both these actions took place under different circumstances, there was no difficulty in procuring amalgams in which they were not present to an injurious extent. It was however evident that changes of another kind occurred, which were so important in extent, as to offer a reasonable explanation of the want of success which sometimes attends the use of these substances.

The changes which occur *out* of the mouth, appear to be identical with those which have frequently been described as "a tendency to form a cup-shaped surface *in* the mouth, and to turn away from the edges of an orifice."

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Certain indications led to the conclusion that these changes were due to the fact, that if an amalgam is carefully packed and stippled into a cavity, some mercury is squeezed out of the first portions introduced, so that when the filling is completed, there is an excess of that substance in the part last introduced. There is evidence that this action takes place in amalgams containing a very small quantity of mercury, even when, in consequence of the dryness of the mass, it is not visible to the eye.

I think there is great probability that during and after the process of setting, some of the mercury leaves the part where it was in excess, and is taken up by the dryer part from which it had been squeezed out, and that this action goes on until the mercury has become equally distributed throughout the mass; the result being, that the part which loses mercury undergoes a diminution in bulk, whilst the part to which it travels, increases in an equal degree.

No change in form appears to take place when mercury is present in equal proportions throughout, as for instance, in cases where the excess at the surface has been thoroughly taken up by a sufficient quantity of dry and powdery amalgam being placed upon it. Or, as in some of the older stoppings, and those made by amateurs, where the whole of the amalgam has been introduced in a mass and simply pressed into place without manipulation. Many of the older practitioners have seen imperfectly made fillings of this kind, which have outlived more carefully made stoppings, and I have always considered this to be the explanation of the anomaly.

Before proceeding to describe any experiments, it may be as well to allude to the difference which is found between newly prepared metals, and those which have stood for some time before being used, whether in the form of præcipitate or in filings. The metals in what may be called a nascent condition, require a very much larger quantity of mercury to form a paste, and they harden with very much greater rapidity, so that experiments made with them do not represent the conditions under which we use our stoppings. Palladium præcipitate, as well as requiring a smaller quantity of mercury after it has been kept a time, refuses to form an amalgam at all after it has been kept longer, but recovers the power after the application of a gentle heat; a higher temperature, however, again interferes with its amalgamation.

Two methods were first used in making investigations; one

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being the well-known specific gravity test originated by Mr. C. Tomes. The other consisted in introducing small pellets into the bulb part of an apparatus like a thermometer, the unoccupied space in which was filled with water; the whole was kept at the temperature of the body, and the expansion or contraction was indicated by the level of the water in the tube. These methods were soon discontinued in favour of others, one of which consisted in placing amalgam in a metal trough with a moveable end in contact with which was arranged a screw micrometer. As soon as the trough was filled, the screw was turned back until the substance had set, when by again turning the screw forward, the most minute change in size would be indicated. Other indications were sought for, by filling small pieces of glass tube which were closed at one end; it was thought that a magnifying glass would show if any change took place, especially at the orifice, and the plan proved very useful. A small size was used, because it would be similar to many dental cavities which we are called upon to treat. It was afterwards found that this was important, because in tubes of a larger size, different methods may be used, by which a closely fitting, but misleading, stopping can be made. Into one of the tubes an amalgam was introduced, prepared from pure silver. The following morning it was found to project from the orifice so much, that some mistake appeared probable; the projecting portion was ground off to the level of the glass, and it was again observed on the succeeding day, when the same amount of projection was noticed as before. Other tubes filled with amalgams of filed and also of præcipitated silver gave similar results. Some of the tubes were cracked by the expansive force and others were split in two, but several remained entire, so that the solid amalgam had not only expanded long after it had become perfectly hard, but it had also flowed out at the opening of the tube. I should have considered this action impossible, had I not recently seen a description of a similar thing taking place with a mass of solid cold iron exposed to heavy pressure.

Some charges of silver amalgam were also placed in the measuring trough, and all of them gave evidence of very great expansion, reaching, as nearly as I can remember (for I cannot find the record), to something like 1-50th of their diameter. Its expansive power ought to make this metal valuable as a stopping. Sir John Tomes says that filings of silver coin were commonly used as a stopping at a comparatively recent period, and I have

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seen an upper canine which had been preserved for many years by an amalgam of this kind, made by its owner, who was in India and far away from any dental assistance.

Unfortunately, silver does not stand the wear of mastication, and has the very bad property of giving up a portion of its mercury to any other metal with which it comes in contact. Palladium amalgam was measured, and shewed very considerable expansion, in one instance to the extent of about 1 in 25 of its diameter. This property is more remarkable from the very small amount of solid matter which the amalgam contains; it can scarcely be used with less than three times as much mercury, and works fairly with six times as much as there is of palladium; copper amalgams contracted slightly, although they are all notable as good stoppings in suitable situations.

From their very general use alloys of silver and tin possess the greatest interest to us. Those which contain the largest proportion of silver were found to expand more than those with less, but not by any means in proportion to the increased quantity of that metal. If too much silver is used, there is the same tendency to give up mercury which has been noticed with pure silver, and which also is a property of copper amalgam.

The addition of gold in small quantity, say from 4 to 10 or 12 per cent., increases the expansive tendency, and causes an amalgam to set more rapidly, but if added in larger quantity, makes the stopping too soft, and causes it to part with mercury very readily. An addition of 3 per cent. of platina has the same effect as gold in many respects, but does not, as has been supposed, alter the tendency to change in form.

An amalgam containing five-and-a-half parts of silver and six of tin contracted in different instances from 1 in 2,000 to 1 in 500.

Another mixture of eight parts of silver and three parts of tin which was put into the trough on the 10th June, 1872, at 10 o'clock, p.m., expanded 1 part in 2,000 before 11 o'clock, and on the 20th the expansion had increased to 1 in 200. The filings used were freshly made, and took a large quantity of mercury to form a workable amalgam, and set almost too soon to be used.

An amalgam with five-and-a-half silver and three tin was tried on 4th May, at 10 p.m.; in half-an-hour it had contracted slightly, and in an hour the contraction was about 1 in 1,500. At 11.20, there was a further increase. The next evening at 6 o'clock, a slight *expansion* was noticed; this had increased at 10.30 to 1 in 2,500;

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on 13th (two days) the expansion had still greatly increased and read 1 in 600; the action continued slightly until the 15th (four days), after which time it was not recorded. On examination at the end of three years, the indication was 1 in 400.

As an example of the action of a similar mixture, with the addition of about 17 per cent. of gold, an amalgam was introduced into the apparatus on 12th May, at 7.30 p.m.; it was hard in 10 minutes, and had contracted about 1 in 1,200, in another 20 minutes the contraction was somewhat less; in an hour, some expansion had taken place, which had increased in two hours to 1 in 800, in another hour it had doubled, being 1 in 400, in seventeen hours it was about 1 in 250, and in twenty-four hours 1 in 200. There was no further alteration in two years, but in three years the general form of the mass had slightly changed. It will be noticed that this specimen contained too much, both of silver and of gold, for general use, and it is one of the very few which showed change of shape, so very long after it had become perfectly hard.

The amalgam which I have usually employed (although it is possibly not the best which can be prepared) contains four parts silver, three parts tin, and about seven per cent. of gold, to which an addition has sometimes been made, with questionable (or at all events uncertain) advantage, of about one per cent. of zinc. A charge of this (without the zinc) was tried, following the last named on 14th May; it first contracted to the extent of about 1 in 1,000, after which it expanded gradually, until at the end of fourteen days it reached 1 in 300; it was not again examined for record until after three years, when it appeared to be rather larger, and, like the last, had become slightly changed in form. These were rather newly prepared filings.

Another mass of amalgam from the same alloy mixed under different conditions shewed much less expansion; another specimen prepared from filings which had also been longer cut up, was tried in 1874, and showed a contraction of 1 in 1,000 at the end of three days. This change is, of course, quite immaterial, and the bar retains its size and form perfectly at the present time.

In addition to the above named and many other home-made alloys, various Depôt stoppings were also tested, and although they all shewed a tendency to slight expansion or contraction, they did not vary greatly from those of my own filing which had been prepared for an equal length of time.

A mass of one of these tested in December, 1881, contracted

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slightly, and then settled down at an expansion of about 1 in 3,000.

Another used in a rather soft condition remains still at an expansion of just about the same amount.

One specimen of amalgam, which was said to have a tendency to expand, shewed in my hands a very unusual degree of contraction, amounting in one case to as much as 1 in 300; (one of my own had contracted about as much).

The last of these which I shall name is an old stopping that has done some very useful work, but in spite of this, a mass of it put into a parallel-sided glass tube, dropped out after it had become hard, and another piece put into the micrometer shewed a contraction of about 1 in 600.

I am afraid that the only thing to be inferred from the notes of these experiments is, that the expansion and contraction of amalgams is a very uncertain quantity; but as has been said, the attempts to measure revealed other unexpected but not unimportant facts. Amongst the earliest subjects placed in the trough, was a first home-made alloy of silver and tin in equivalent proportions; these had been melted together without much care being taken over the process; the amalgam when hard, retained its form for a short time but soon *appeared* to have expanded, the following morning the whole surface was found to be studded with small tubercles, which became more conspicuous in the course of one or two days, making themselves seen even on parts which had been scraped free from them after their first appearance. A little consideration suggested that these appearances were due to small particles of undissolved silver, which expanded more than the surrounding substance, but it also suggested that important changes could take place amongst the particles of a solid mass of stopping, long after it had become hard, and that probably some mercury had left the tin portion which it had first joined, and had afterwards become attached to the silver.

After re-melting the alloy, nothing further occurred of the same nature.

In the next experiment, the amalgam was put into the trough in successive layers, the lower portion being carefully stippled in with a very small round-ended burnisher, and each successive portion treated in the same way. When finished, the upper part was rather moist from the excess of mercury which had been squeezed out in the process of packing. This was removed to moderate dryness but without any especial, or rather, unusual care;

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when set, its length was measured, and it was laid aside till the following day for further measurement. In the morning, however, this could not be accomplished, as it did not fit the trough at all, both the ends having turned up to a notable degree; at the end of another day the change was still more marked, and finally, it presented the appearance of a boat rather than the original form of a straight triangular bar. Of course the experiment was repeated more than once, but the results were always similar.

It was thought that the change of form might be caused by the upper surface of the bar having contained more mercury than the lower, and that this excess had gradually been transferred to the dryer part. If such an action had taken place, the upper part would probably have contracted and become shorter, whilst the lower side would have become longer, and hence the bending. Acting upon this idea, the trough was again filled with a rather moist amalgam, and the excess of mercury on the surface was well scraped away. A quantity of very dry amalgam, containing three or four times as much filings as mercury had been prepared, and was packed on in place of the moist part which had been removed, so as to equalise the distribution of the metals. After the bar had become hard, it was examined repeatedly, but it never showed the smallest indication of tendency to turn up at the ends, and it retained its form as long as it was under observation. Many bars made in this way for measuring are still preserved, and show no change in form at the end of from four to twelve years, which is a sufficient time for all practical purposes.

Very few experiments were made with amalgams in a dry and powdery condition throughout, as those which were made showed a marked tendency to contraction, after which they changed in form so greatly that they could not be measured, whilst the test pieces, which were made of a moist bulk and well dried upon the surface, acted more satisfactorily than any of the others.

The exceptions to the bending tendency in some bars composed of a single metal, were very striking. One bar of palladium amalgam, after changing shape very considerably, returned gradually to its first form, and one or two pieces of Sullivan acted in the same manner. The only explanation which occurs to me is, that these substances being in a very fine state of division, each atom takes up as much mercury as it requires at once, whilst the larger grains of the filings which are used in alloyed metals only take up mercury on the surface, and afterwards appropriate any surplus that is within reach.

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Many experiments were made with glass tubes. In some of these, amalgam introduced in a mass without packing became loose in every part after a few days. In others, the amalgam was introduced in small pieces, each of which was packed in carefully and well stippled down towards the bottom; the top, though left moderately dry, was not carefully loaded with dry mixture. At first, all the stoppings appeared to fit well and the tubes had a mirror-like surface all over; after a few days the lower part remained moderately bright, but the upper half became dull in all of them. When in this condition, a number of them were put into a small cup containing blue dye and attached to an exhausting syringe, by means of which the air contained in any spaces that existed was very much rarified; consequently, when the air was re-admitted, the dye was forced into every unoccupied space, including the minute capillary tubes in the substance of the glass itself. The upper part which was previously dull looking became deeply stained with dye, but the lower part remained bright, showing that the material in this part had undergone very marked expansion, at the same time that the other end showed the opposite action.

In the experiments which have been mentioned, there is no *proof* of the transfer of mercury from one part of a mass of amalgam to another, although the results seemed to indicate the probability of such an action. More recently, however, another method was adopted, with a view to procure further evidence.

Two pieces of hard wood held together by a screw clamp, had a hole bored between them, so that each of them formed one side of a cylindrical space of ¾ of an inch in length, by $\frac{1}{16}$ diameter. A charge of amalgam was prepared with rather more filings than mercury, and introduced into the cavity in small pieces, each of which was carefully stippled down towards the bottom; when finished there was a great excess of mercury at the surface, but the whole became moderately hard. As soon as this had taken place, it was turned out by taking off the clamp and separating the sides; the piece was cut in two at about an equal distance from the two ends, and the two parts made to weigh exactly the same, by taking some from the cut part of one and adding to the other. The weights were carefully noted down. Another cylinder of amalgam was made in exactly the same way, but instead of being divided at once, it was allowed to stand for seventeen days, when it was also cut into two ends of equal

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weight. All the pieces were then exposed to a heat sufficient to drive off the mercury, after which each portion was weighed again, to ascertain what proportion of mercury it had contained. The following were the results :

WEIGHTS OF FIRST BAR OR CYLINDER.

Upper end...	27 grs.	Lower end	27 grs.
After heating	12¾ „	After heating	15⅝ „
Loss (mercury)	14¼ „	Loss (mercury)	11⅜ „

Excess of mercury in the upper, over and above the lower end, 2⅞ grs.

WEIGHTS OF SECOND CYLINDER.

Upper end	27½ grs.	Lower end	27½ grs.
After heating	15 „	After heating	15⅜ „
Loss (mercury)	12½ „	Loss (mercury)	12⅛ „

Excess of mercury remaining in the upper end ⅜ gr. only. (1/6 of first piece.)

It is, of course, impossible to prove that the upper end of each of these tubes contained, after they were packed, exactly the same excess of mercury, but several masses gave similar results. It appears, therefore, that there is an approach to positive proof that after the stopping mass had become hard, a quantity of mercury, weighing something like 2 grs., was transferred from its upper to its lower end. There was, however, an excess of ⅜ gr., still remaining at the moist end, but it would probably have followed the other if more time had been allowed. Of course no such excess of mercury would be allowed in practice to remain on the surface of a stopping. The large amount was left there in order to make the experiment more striking.

One cylinder made in the way just described was left for two days only before being divided, and then appeared to have an excess of about 1 grain of mercury in the upper end; thus suggesting a partial transfer of that metal.

One other experiment was interesting, although it proved nothing but absence of transfer. A hole was nearly filled with moist amalgam and the excess of mercury was scraped away. The upper end was then filled up with dry amalgam, containing only one-fourth its weight of mercury. When divided and treated as in the other cases, it was found to contain exactly the same quantity of mercury in each of the two ends. Of course this *very* equal proportion was, to some extent, a matter of acci-

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dent, but the attempt to obtain such a condition is probably our best road to success in employing this highly useful class of stopping materials.

The PRESIDENT said he was sure they all congratulated Mr. Kirby on his persevering zeal in the investigation of the properties of amalgams. It would be very desirable if he gave them the results of those very numerous experiments which they would not have the energy or zeal to carry out for themselves, and perhaps at some future period Mr. Kirby would be able to give them such an amalgam as would embody all the qualities that they knew to be most desirable. There was rather an inclination to use gold stopping in preference to any amalgams; however, he did not pin his faith to gold as compared with amalgams. Everything depended on the condition of the organ dealt with, and on whether the cavity was the more suitable for the one or the other. It was best, he believed, to act on an eclectic principle and adopt whatever material appeared the most suitable to the case.

Mr. DENNANT said what chiefly struck him in connection with the paper was the importance of arriving at exact methods of using amalgams. He believed that to a great extent they had been too much used by rule of thumb. The methods which had been introduced to their notice from the opposite side of the Atlantic were likely to yield permanent results.

Mr. KIRBY remarked that the composition of the amalgam was a secondary matter. The method of using it was the principal thing. Any amalgam might be taken; but some were more liable to contract than others. Choose one of a kind the least liable to contract; mix the first portion of it in a rather moist condition; fill the major part of the cavity with it; and finish off with amalgam in a very dry condition.

Mr. LLOYD WILLIAMS said he felt very much indebted to Mr. Kirby for his experiments. Up to the time of the meeting of the Association in Glasgow last year he (Mr. Williams) had been absolutely without any confidence whatever in amalgams, and he had tried most methods of introducing them. His belief had been that no matter how they were put in they would sooner or later fail, except in some few cases where, owing to various circumstances, any sort of stopping would save the tooth. But after having had a conversation of some length with Mr. Kirby at that meeting, and learned exactly from him what his method of putting

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in amalgam was, he felt bound to give it a trial. He did so, and the result was that he had since adopted Mr. Kirby's method entirely. Cases in which the use of the method had extended over a period of twelve months had proved most satisfactory; and he now felt a certain amount of assurance that his stopping would not prove a failure as it had done before. If, therefore, members gave his method a conscientious trial he believed they would have a great many less failures than they had been in the habit of having.

Mr. KLUHT (London), asked whether he was right in understanding Mr. Kirby to say that the tendency of the amalgam put in according to his method was first to shrink and afterwards to expand?

Mr. KIRBY said that the amount of contraction that took place was so small that it might be left out of account, and in answer to a further question, replied that he used no kind of varnish.

THE AMERICAN DENTAL ASSOCIATION.

The PRESIDENT: A communication has been put into my hand. from Mr. St. George Elliott, President of the American Dental Association, inviting the members of this Association to attend the next meeting of the former, which is to be held in Paris on the 22nd of August, 1889.

On some Work-room Appliances.

BY A. J. WATTS, L.D.S.I.

WORK-ROOM appliances ought, I think, to receive more attention from dentists than they have hitherto done; the various depôts and manufacturers do their best to supply our wants, but it is hardly possible that they should know exactly what kind of tool will best suit a dentist for use in work-room or surgery.

There is no doubt that instruments used for operations are far better designed for the work they have to do than are the tools usually sold for the work-room, for the simple reason that these instruments are designed by our best operators.

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For some time past Mr. Pearsall and myself have endeavoured to reform and invent several tools or appliances that have proved to be very useful, and I will venture to say, a decided improvement on the tools usually sold for the same purpose.

I will first mention the work-room bench designed by Mr. Pearsall; the principal features are: first, that it is much higher than ordinary dental benches, the height being forty-one inches; secondly, the absence of legs or standards, the support being from strong iron brackets bolted to the wall; thirdly, the simple and efficient device for holding bench tools. The increased height, I feel certain, is a great improvement, for work can be done either sitting or standing, and it offers a very convenient support for grinding or polishing headstocks at the same time. The absence of standards or legs is also a desideratum, as the floor is left comparatively clear, and a tooth dropped can be readily found. The device for holding the tools is simply a thin shelf fixed about two and a-half inches from under surface of bench and corresponds in outline with bench, whether it is straight or curved; it is then divided into partitions to take the various tools; the advantage we claim is the readiness with which any tool can be found and yet remain out of the way during work; I consider it better than keeping them in a drawer. The casting trough, exhibited in the work-room section, was designed in 1853 by the late Mr. Pearsall, and answers its purposes admirably; it is 36 inches long by 18 broad by 11 inches deep, the sides stand outward, the end pieces are upright, it is supported on four legs, and there is a tray under trough for holding casting rings or boxes.

The casting sand we use is the best I have seen, as it does not contain clay. It is much more easily worked than the sand usually sold for the purpose; it is to be had in Belfast. Mr. Pearsall's leaden stand for catching the water from corundum wheels is a decided improvement on the tinned iron ones; it acts well as a rest for the hands, and the disadvantage of having a pool of water is entirely dispensed with, hence a tooth dropped can be immediately picked up. The provision for carrying off the water is by a tube fixed about a quarter of an inch from the bottom, thus allowing the gold deposit to subside. A glance at the one exhibited will give a far better explanation of it than any attempt on my part.

The steel punches I have here were made by Mr. Pearsall. I have found them superior to any others for chasing gold plates.

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The swaging hammer designed by the late Mr. Pearsall was made in 1857, and is somewhat like a gold-beater's hammer. Its special features are the broad hammer face that strikes the cast and gives a very equal blow when used, rarely causing a cast to widen out or split; the eye is placed one-third of the hammer head's length from the pane, thus leaving fully two-thirds of the weight below the eye. The shaft is seven and a-half inches long and slightly curves downwards, the weight of hammer head is eight pounds. I can strongly recommend this pattern.

The seats we use have been designed by Mr. Pearsall and myself, they have the advantage of being instantly raised or lowered, and the seat is made to revolve, thus accommodating all the little movements of the body, and reducing the wear and tear on clothes; it is also well suited as an operating stool.

I wish now to draw your attention to a complete vulcanizing apparatus, comprised of flasks, cramps and vulcanizer, made especially to meet all the requirements that a dental mechanic may want. In the first instance, the flasks are designed to take either method of flasking, as shown by the patterns I have here; you will notice that there are but two distinct parts, and that the guides are inclined planes, which greatly helps opening or closing, especially if there are any undercuts; these flasks are made in gun metal and are considerably thickened where the strain comes. I have some here that have been in constant hard use for the past three or four years, and are just as good as the day I made them; they were cast by the aid of Mr. Fletcher's injector furnace, in Mr. Pearsall's work-room, and they are made in two sizes.

The cramps are also made of gun metal, the upper angles of which are webbed, giving great strength where it is needed. The screw has a loose piece attached to it that revolves, or remains stationary while screw revolves; the object of this is to disperse the pressure, and thus preserve the upper part of flask from the damage that always results from using a plain set screw; these cramps are made in three sizes, to take one, two, or three large or small flasks respectively. The vulcanizer has been made expressly to do away with the leaden or composition jointing; as I need hardly tell you, if there is an escape of steam, by the wearing out of the packing, the valuable steam gauge invented by Mr. Gartrell becomes useless as soon as the vulcanizer becomes dry; now to meet this evil I have adopted the ground and bevelled joint

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which only requires to be kept clean and slightly greased, and will work well for an indefinite period as it never requires re-grinding, so that you may always rely on it as a permanent joint. Another valuable point is the absence of steel pins with which the cramp is usually fixed; I have, you will see, made the cramp to fit into two slots one on each side of vulcanizer; these slots are made very strong and will resist an enormous pressure. The body of vulcanizer carries besides these slots the safety valve and the blow-off-cock all in one casting, which reduces the cost considerably. The cover and body of the vulcanizer are made in gun metal, the cramp is the best forged iron, and the screw steel. Vulcanizers, flasks and cramps are made by my brother, M. H. Watts, engineer, Macclesfield. The vulcanizer is made in three sizes, the smallest is 4⅝in. inside diameter by 3½in. deep, the second size is 4⅝in. inside diameter by 6⅛in. deep, and the largest is 4⅝in. inside diameter by 8¾in. deep; these measurements apply to the body of vulcanizer and do not include the dome-shaped cover. All these vulcanizers are fitted with Mr. Gartrell's gas regulating steam gauge, and with Mr. Fletcher's solid flame burner made specially for vulcanizers; they are sent out after being tested up to 300lbs. pressure.

Implantation of Teeth.

By GEORGE CUNNINGHAM, B.A., D.M.D., L.D.S.

Definition.—By implantation is meant the drilling of artificial sockets in the maxillary bones and the insertion therein of natural teeth of suitable size and form. This operation which is essentially one of "yesterday," is often described as nothing new simply from failure to differentiate it from the cognate operations of replantation and transplantation.

Replantation consists in the replacement of a tooth which has been extracted or dislocated in the alveolar socket of the same

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patient, while by transplantation is meant the extraction of a tooth from the alveolar socket of one person and its replacement by a similar tooth extracted from another. The conditions and circumstances under which these two operations are undertaken differ in some very important details from the operation of implantation. "In replantation, as this operation is usually performed, the parts, that is the pericemental membrane, the apex of the root and the alveolar process immediately surrounding these are highly inflamed, in a state of disease with pus either already formed or forming at the end of the root, and the operation is undertaken with a view to relieving or aborting an alveolar abscess. The portion of the diseased apex is then cut off and the tooth is forced back into the cavity. Here we have a diseased root thrust back into a diseased socket. . . . In transplantation there is a healthy tooth, but it is usually made to take the place of a miserably old diseased root that has been growling and festering in a diseased socket for years. The diseased root is pulled out, but is the disease in the surrounding alveolus extracted with it? . . . In implantation we have a healthy root in a healthy socket, and therefore the factors that tend to the destruction of the root in replantation and transplantation are not present and therefore not operative in implantation."

Dr. Weld in the chapter he contributes on Replantation and Transplantation of the Teeth to the American System of Dental Surgery, points out that this argument, however, hardly holds good as to these replantations after the attachment of artificial crowns cited in his paper, in nearly all of which cases both roots and sockets were healthy, while ultimate failure was the result of all.

Without endorsing Dr. Younger's contention that the factors which tend to the destruction of the root in replantation and transplantation are necessarily absent in implantation, we must admit that the conditions and the circumstances are not identical, and that the new operation merits careful and scientific investigation at our hands.

History.—In the "American System of Dental Surgery," you will read that Dr. Younger first performed this operation in 1881. This is far from being correct, the operation referred to was simply one of transplantation. Dr. Younger's own account is as follows:—"My former practice (in transplantation), when I found a root was too long or too wide for a socket, was to cut off the apical extremity,

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or shave off from the surface of the root, the necessary quantity to insure a fit: but so often the best portion of the pericementum was in that way removed, that I tried deepening or widening the cavity, as the case required, often cutting freely into the bone in order to save all possible of this valuable tissue. I found that adhesion took place in this portion as perfectly as in the unbroached. The consideration of this led me to the grand conclusion, that *artificial sockets could be drilled into the bone itself and teeth planted therein as successfully as into the natural cavities.*

"My first operation of this nature was reported to the California State Dental Association, in August last (1885), and its success was witnessed by them several weeks after its performance. On June 17th, 1885, Miss Ward, a young lady of twenty-four, presented herself. She had lost the left superior lateral incisor, root and all, four years previously, and had been wearing, as a substitute, an artificial tooth on a rubber plate. The collapse of the gum, consequent on the absorption of the alveolus, was so great, and the exposure of the gum so much, in conversation, and especially in smiling, that the falsity of the denture was immediately recognized, and was an object of great distress to her. As it was impossible, for the reasons just given, to produce an artificial substitute that would look natural, I determined on the following operation, one that I had for a long time contemplated, and which, though satisfied in my mind, in consequence of certain observations and experiments, would be successful, seemed so opposed to scientific thought and the established rules of surgery, that I had not before screwed up my courage sufficiently to attempt it. I took a corresponding lateral from a young man, which, from its awkward position was disfiguring his mouth, and prepared it as I do all teeth I use in transplantation, viz., removed the pulp, filled the pulp-chamber and root-canal with Hill's stopping, and finished the apex with gold. The tooth was then placed in water of the temperature 100° to 110° Fahrenheit, to cleanse it of all blood and impurities, and allowed to remain for about one hour. It was then placed in a bath of bi-chloride of mercury, 2 parts to 1,000 water, for about fifteen minutes, to disinfect it. The tooth being now ready, I turned my attention to the patient. I cut a hole in the gum a little less than the diameter of the root to be inserted. I then took an ordinary flat, angular-edged drill, and drilled into the bone in the line of direction the tooth was to occupy. When fully deep enough, I widened the cavity, and formed the socket

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with a cone-shaped burr. When I found by the trial that the cavity would receive the tooth perfectly, I carefully washed and sponged it out, in order to remove every particle of detached bone, first with warm water, then with cold, and lastly with the bi-chloride solution already referred to, and when the bleeding had ceased, I introduced the tooth, and kept it in position by delicate silk ligatures attached to the central incisor on the right and to the canine on the left. There resulted a little swelling over the root, which remained a few days and then gradually disappeared.

"An accident to the gum occurred during the development of the socket. Just as the drill touched the surface of the bone, the young lady jerked her head back, which caused the instrument to slip forward and through the gum, making a triangular-shaped gash of fully an eighth of an inch in length. Before the tooth was inserted the edges of this cut were brought carefully together and retained in contact by delicate silk sutures. On the fourth day the sutures were removed, and no mark was apparent to tell of the lesion that had existed. In twelve days I removed the ligatures from the tooth and found it well attached. I then removed the threads to fix the tooth while the callus formed round the root. About three weeks afterwards, the gum being free from every sign of irritation and the tooth comparatively firm, and desiring to improve the position of the right superior central and lateral, I had to pass the ligatures around the new tooth. This, unfortunately set up a slight inflammatory action, and an epulis formed a few days after, and a little discharge of matter took place. I thereupon moved the ligatures and treated with injections of iodine. When last seen the epulis had nearly disappeared, the surrounding gum had resumed its normal look, the tooth became firm in its position, and performing its functions in common with its fellow teeth as though it had never been a stranger in the mouth.

"This case was examined by several physicians, and by the members of the California State Dental Association, who, with the exception of two, pronounced the operation a great success. These two gentlemen were not thoroughly satisfied with its stability because only of the epulis that had formed.

"On the 15th August and 5th September, 1885, he operated for his second patient, aged thirty-five. In this case the superior bicuspids had been lost about twenty years, and during which time she had worn artificial dentures. The lady expressed herself

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with regard to the operation as follows: 'When I think that for twenty long years I have had to wear a nasty old plate, and now I have instead natural teeth growing in my mouth, I feel so happy that I cannot express myself.'"

The first accounts of Dr. Younger's method of implantation contained more or less facetious allusions to his keeping a stock of live teeth in the combs of innumerable roosters. The incredulous if not the absolutely scoffing journalist thereupon treated the affair as a huge joke, and drew vivid pictures of the Californian Cocks' Comb Tooth Supply Association, Limited. From Dr. Younger's own publication, the fowl facts seem to be as follows:—In his endeavour to prove that the operation of transplantation could be made a success, he determined to repeat the experiment of John Hunter who, to test the vitality of the pericementum, planted a tooth in a cock's comb, with this difference, that he took the precaution of removing the pulp and filling the pulp chamber and root canal with gutta percha (Hill's stopping). To prevent any trouble from decomposition of the pulp, the tooth was well cleansed in warm water and dipped into a disinfecting solution. The success of the experiment satisfied him that the "pericementum would attach itself to any vascular body, and that if properly planted in a fresh socket it would attach itself and form a living union with the surrounding tissues. The great and only difficulty I had to contend with was the procurement of teeth at the time they were needed. At last a way suggested itself. I applied to my dental friends for whatever good teeth or roots the exigences of cases required them to extract. The experiment of Hunter and my own experience had taught me that teeth could be kept alive indefinitely in cock's combs. But could they be transferred to the human mouth again and made to grow there? I concluded they could, and my first experiment verified my conclusion. On November 28th, 1882, a bicuspid that had been in a cock's comb for ten days was transferred to the mouth of a gentleman, where it fastened itself as if there had been no gallinaceous period in its existence."

Dr. Younger, in his first paper, gives an account of his first seven cases of implantation, but no mention whatever is made of the teeth having passed through an intermediate stage in the comb of the cock. Where the history of the scion tooth is given at all it appears to have been out of the mouth only a few hours, and sometimes only the time necessary for its adequate preparation.

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In July, 1886, Dr. Younger read his second paper on "Implantation of Teeth and Pericemental Life," before the California State Dental Association. In it he announces that since the publication of his first paper on "Transplantation of Teeth into Natural and Artificial Sockets," he had made some discoveries which had perhaps best be described in his own words, and more especially so since the original communications are inaccessible to most readers on this side of the Atlantic.

"I have made a discovery in regard to the vitality of the pericementum, that is even more startling than the success of the operation of implantation itself. In the pamphlet I recommended the use of cock's combs as a means of preserving the vitality of the peridental membrane, and also mentioned that in two instances the life of this membrane had been preserved for over fifty hours in tepid water. I now, however, have to report a case —one of several—which proves that these means are not at all necessary to preserve the vitality of this, the most wonderful tissue in the human body; that this vitality of the pericementum is marvellous, and that it may be as tenacious as that inherent in the seeds of plants.

"In the early part of March, 1886, Mrs. Dr. H. G. Blankman, the wife of one of the pioneer dentists of this coast, brought me a bicuspid that had been extracted at her solicitation, in Sacramento, on the 31st day of January, 1885, in the belief that it was the seat of a neuralgic pain, which had been the cause of great anguish to her. This tooth, brought to me after this long lapse of time, had in the meanwhile been carried about in her portemonnaie, stowed away in her jewel case, and shuffled about in her bureau drawer. And this tooth she wanted replanted in her jaw! My first impulse was to laugh, my next to argue with her about the impossibility of success of such an operation, explaining to her that it was due only to the vitality of the membrane covering the root that the operation owed its success; that, without this living membrane, the tooth was as impossible of attachment as so much bare ivory or porcelain, and that while I had succeeded in keeping this membrane alive for over two days, it was by constant immersion in warm water at a blood temperature; but that the pericementum of this tooth was, as she herself could see, as dry and shrivelled as parchment, and as devoid of life.

"Just as I had persuaded her of the impossibility of success, there flashed through my mind a passage in John Bell's work on the

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'Anatomy and Physiology of the Human Body,' that I had lately read, which awoke the suggestion that success in implanting that tooth was, after all, possible.

"This eminent surgeon, in criticising an article by the famous John Hunter, says:—'How can such vitality exist independently of a circulation? But there are not wanting examples of an obscure and low degree of life existing in animals' ova, or seeds, for seasons without circulation; and if for seasons, why not for a term of life?'

"While this passage did not bear directly on the subject in question, it somehow awoke a train of thought that led me to the conclusion, that in that dry, shrivelled membrane, there possibly lay lurking a dormant life, which under favourable conditions would rouse its energies and make the tooth enclosed once more a living, useful organ.

"I had proved that the peridental membrane possessed a wonderful tenacity of life, in at least two instances, where, after it had been removed from all life-giving connection for fifty-two hours, it was as vigorous in forming attachments as though it had been planted immediately after removal. I therefore reasoned with myself, if this peridental membrane preserves a vitality unimpaired for fifty-two hours, why not for so many weeks or months? So I said, 'Mrs. Blankman, the idea has just occurred to me that what you want done is, perhaps, possible.' And I explained the cause of this revolution of opinion, as she is not only a brave but a very intelligent woman, and continuing, said:—'I will perform this operation as an experiment, to test the vitality of the pericementum; for, though I have no positive expectation, I have a hope of success.' So on the 11th of last March, in the presence of, and with the assistance of Dr. Alexander Warner, who was acquainted with all the circumstances of the case, I drilled a socket between the first left superior bicuspid and first molar, and after soaking the tooth in water—temperature 120° Fahr.—for twenty-five minutes, to soften the membrane, restored to the jaw that which it had been deprived of just thirteen months and eleven days before.

"As the distal aspect of the tooth was perfect, and the approximal not, I turned the tooth, thereby much improving the original appearance of that portion of the mouth. When the operation was finished, the tooth was found so firmly fixed in the socket that retaining ligatures were not applied, and union took place as rapidly and as thoroughly as if it had been a fresh tooth.

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"The tooth retaining this firmness, and no swelling nor pain ensuing, the lady commenced eating with it, and at the end of twelve days became so careless in her use of the tooth, that she bit a hard crust of French bread with it. This was too much; the tooth received a wrench which loosened it and caused the gum to bleed profusely. Next morning she hurried to the office, and with tears in her eyes, narrated the accident. I found the tooth quite loose, but not dropping, and the gum on the palatine surface swollen, and with the evidence of having bled at the margin.

"In my heart I was glad the accident had happened, for to me it was a test of the question whether the retention of the tooth was due simply to the nice adaptation of the walls of the socket to the root of the tooth, and therefore only mechanical, or whether it was really due to awakened life in the peridental membrane, and consequent vital connection with the living environment of gum and alveolar substance.

"If mechanical, I argued, the irritation that has been set up around it, especially in its present loose condition, will cause its expulsion; but if vital, it will be retained and become firm again. I therefore did not seek to retain it in place by any ligature, but simply painted the gum with tincture of iodine, and cautioned her not to chew on that side until I gave her permission. In one week all marks of the accident had passed away, the tooth became again firmly fixed, and remains to the present moment as solid as a rock. I have tried, since then, to pass a delicate instrument, the point of which had been flattened for the purpose, between the gum and the tooth, but the act gave as much pain, and the instrument met with as much resistance, as in the tissues surrounding the teeth that had never been disturbed in their sockets; all of which clearly proves that the pericementum of that tooth, dry and shrivelled as it was, had during those long months of absence from any life-supporting substance, tossed about from place to place, from pocket and purse to casket and drawer, preserved a vitality as fresh and vigorous as when it was removed from the place in which it grew.

"I am happy to say, that Mrs. Blankman has kindly consented, in the interest of science, to present herself to you this afternoon, in order that you may examine this tooth, and satisfy yourselves by personal and thorough examination, as to the success of the operation. And I want each and every one of you gentlemen to test in every way that your ingenuity may suggest, short of extrac-

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tion, the statement I have made, that vital connection has been established between the tooth and the walls of the socket, as perfect as that of the other teeth that have grown there and never been tampered with. I have since tried implanting teeth which have been extracted for weeks and months, with equal success, proving the wonderful tenacity of life of the peridental membrane.

"The question now to my mind is:—'When does the pericementum die?'

"In consequence of these experiments, and the equal success of implantation of long extracted teeth with that of fresh ones, I have discarded, as unnecessary, the warm water and the comb of the troublesome cock. I now simply lay the teeth aside in a clean, cool, dry place, and prepare and use them as I want them."

As is not unusual when a new operation is brought prominently into notice, a certain number of claimants arise to assert their rights to priority as discoverers of the same. Thus it is said that implantation was first practised by Dr. Mitscherlich of Germany. As far as I can gather from his monograph, he transplanted teeth from the corpse and even inserted special prepared artificial teeth into recently vacated sockets. No mention whatever occurs of any artificial socket having been made. The term implantation is frequently used in this as well as in papers by other authors, but always as synonomous with replantation or transplantation. Herr Witzel and Professor Sauer, are also accredited with having performed the operation of implantation prior to August 1881, and with having reported the same at the meeting of the Central Association of Dentists in Germany. Dr. Bing of Paris and Dr. Palmly Brown also claim to have performed the operation of implantation some twelve or more years ago.

However that may be, it is certain that to Dr. Younger alone belongs the entire and sole credit of bringing the operation forward in such a way and with such enthusiasm, that it has quickly resulted in its being included in the category of practical dental operations.

Younger's Method. This now brings us to consider Dr. Younger's present method of operation, and I cannot do better than describe the operation as I saw him perform it at the clinics of the International Medical Congress. The operation was further increased in interest by the recognition of one of the English contingent in the chair as a patient. I immediately exacted a promise from our friend Gartrell, of Penzance, to give me an

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account of the operation from the patient's point of view. The patient was forty-eight years of age, and had lost two lateral incisors some four years ago, and had hitherto worn a partial upper plate. The alveolus was considerably absorbed, and the gum formed the usual marked crescentic depression between the central and the canine on each side of the mouth. A median incision was made from the centre of the labial aspect of the central incisor across the depression to the corresponding centre of the labial aspect of the canine, and the gums dissected from the alveolus for some little distance. After selecting two trephines, which corresponded with the two principal average diameters of the root of the tooth to be implanted, he began with the larger one, estimating the depth to which he should carry it by a reference to the measurement of the length of that part of the root. He then followed with the smaller trephine, and similarly formed a cavity for the upper part of the root, and then with the giant cone bur he tapered and formed the apex and sides of the cavity, meanwhile trying the tooth to be implanted several times. In a wonderfully short time the tooth was placed in position and firmly ligated with silk. In this case, on examining the artificial socket on the right side by means of a blunt probe, it was evident that the outer plate of the alveolus had been quite removed by the trephine, and the gum perforated on the labial aspect some distance from the margin. The socket on the left side, however, was complete on all aspects. The time occupied in preparing instruments, taking measurements, &c., was about ten minutes; the actual time of the second operation—that is, forming the artificial socket and implanting the tooth—was only about six minutes, and the whole clinic in which the two teeth were inserted, even including delays, did not exceed three-quarters of an hour. Dr. Younger lays considerable stress upon the necessity of sterilising all instruments, syringing the mouth and the cavity with a 1°/₀ solution of mercuric chloride. I cannot help thinking that too much stress seems to be laid upon the necessity of these antiseptic precautions. In an operation such as this in the cavity of the mouth, strict Listerism is not attainable. I do not depreciate in any way the observance of these precautions being taken; but I think my criticism is justified when the operator, after carefully sterilising his hands, proceeded to dry them on an ordinary towel which had been freely exposed to the atmosphere. The history of the teeth which were implanted in this case was obscure; they

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certainly had been extracted some time, and therefore had become perfectly dry. Previous to their being placed in the sterilising solution the pulp cavities and canals had already been thoroughly cleansed and filled with Hill's stopping, from an opening on the palatal surface of the teeth. With regard to the effect of the operation upon the patient, I must say he seemed to stand it uncommonly well, and, from my observation of this and other cases, I certainly feel that this aspect of the operation should be no great barrier to its being adopted. The tooth when first implanted had a very white, unnatural look; but a decided change was perceptible in quite a short time:—the colour becomes uniform with the other teeth in from two to six weeks. It was indeed extremely interesting to observe how implanted teeth, chosen haphazard so far as colour is concerned, become almost, if not really, indistinguishable from the normal natural teeth.

The following letter from Mr. Gartrell clearly describes these operations from a different point of view—that of the patient:

October 26th, 1887.

DEAR CUNNINGHAM,—In reply to your enquiry *in re* notes on my implantation case, I send you the two teeth used, and I shall be glad if you will have them examined under a microscope, and let me know if there is any pericemental membrane on them or not. They are, as you see, the right and left superior laterals, but whence they came, and to whom they belonged, I cannot say. I believe they were picked out from a lot of extracted teeth at some dentist's at Washington. Nearly all who spoke to me as to the operation were curious to know the severity as regards pain. My answer has been that it is quite as bad as having a tooth out. After the first incision the detaching of the periosteum, before drilling the hole, is the most painful. The drilling and burring out of the socket is, however, bad enough, and got worse as it neared the end. In my case, however, I think it was worse than usual, as the whole of the outer or labial plate of the socket for the right lateral was cut away; and the instrument finally passed through the gum on the labial surface, which was afterwards held together by a stitch of silk thread. The left lateral had a very thin plate of bone on its labial surface, but the trouble with this tooth was that it was a very thick one, as you can see by looking at it, so that it came in the way of the bite. Dr. Younger tried to correct this by grinding off the cutting edges of the lower laterals, but he did not take off enough to do any good; the consequence was that after five or six days' use the silk ligatures had slackened a little, the teeth got very loose and moved with the least possible force—such as suction in drinking, &c. The right lateral could also with very slight pressure be pushed up into the gum an eighth of an inch too far, the root pressing the gum outwards

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before it. The left lateral was also being constantly interfered with by the lower teeth ; also the hurry sometimes in travelling prevented my taking as much care of them as I might have done at home. In fact, there ought to have been a platinum plate struck up to fit the palatal surfaces of the whole of the front teeth, with the platinum passing up over the cutting edges of the two implanted teeth, so as to protect them and to keep them steadily in their place. I got my cousin, a dentist in Ottawa,* in Canada, to tie the teeth with fresh ligatures, but they got so loose and uncomfortable that I concluded that it was useless to persevere any longer ; but I will try the operation again at home when I can get two fresh good teeth and can give proper attention to taking care of them afterwards. In my case Dr. Younger worked very hurriedly, taking about six minutes in inserting the left lateral, reckoning from the first incision to the tooth being placed *in situ.* I felt that I could have stood the pain better if a longer time was taken, but he wished to operate against time and astonish the natives. I think he made a mistake in not leaving a plate of bone on the labial surface of the right socket by drilling the hole more towards the palate. This might perhaps have interfered with the tooth taking its place in the arch properly ; in which case I think it would be better to place an artificial tooth upon a natural root at the proper angle. I should have been glad if cocaine had been tried in drilling one of the sockets, so as to note the difference in the pain ; but the whole operation was done hurriedly, and proper care was not taken afterwards, which no doubt accounts for its failure.—Yours sincerely,

J. H. GARTRELL.

Dr. Younger also performed other clinics, which I have no doubt will be duly recorded.

Dr. Louis Ottofy made an artistic implantation of a right upper incisor. The tooth replaced had been extracted some seven years. The history of the implanted tooth was unknown, but was an ordinary dry extracted tooth. The patient, on being questioned as to the pain of the operation, said it was not much, and would be quite ready to undergo it again. In this case the operator demonstrated the great utility of the Mellotte moldine apparatus, by means of which he quickly struck up a cap of thin gold plate (32 American gauge). This was fixed in the mouth with white cement, and must constitute a valuable adjunct by placing the implanted tooth under the best possible conditions for union.

* On further enquiry, Mr. Gartrell informed me that the teeth got so loose that he could not get on with them about ten days after insertion, and on the twelfth day his cousin replaced them again, when he kept them in for another day ; then the silk ligatures gave out again, whereupon he placed the teeth in the little box in which he sent them to me.

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In some earlier cases which have been reported, the apical end of the canals was closed with gold screws, the ends being smooth and neatly polished. Such a proceeding seems to us not only unnecessary, but really detrimental, by causing a possible source of irritation and unnecessary exposure of the cementum; just as in replantation, excising the end of the root seems disadvantageous.

To digress for a moment from the clinics, I spent several days in the genial society of Dr. Younger, in New York, when I had the opportunity of inspecting the results of some of his operations, performed about a year ago. I merely recite one case as being not only typical, but readily accessible. There is a man of colour, one of the *employées* at the "S. S. W." New York Branch, who had a right upper central incisor implanted on the 5th October, 1886. The tooth replaced had been removed three years and a-half before the operation of implantation. The appearance of the gum and tooth is perfectly normal and natural. The tooth implanted was an old dry tooth, and has given the patient no trouble or bother. The patient is extremely proud of this tooth, but not unnaturally resents somewhat strongly the needless pulling about, which some hundreds of dental examiners have deemed necessary to bestow upon it.*

A very interesting application of implantation was made by Dr. Younger, in the case of the wife of a well-known dentist in New York. There was congenital absence of two laterals, which constituted in the mouth of a pretty woman a considerable deformity. The two centrals having been previously brought in apposition, two incisors were implanted with the happiest results from an æsthetic point, and with the most promising prospects from a surgical point of view.

The subsequent inflammation in such cases is usually of the very slightest, apparently causing little uneasiness to the patient. His experience is that very few patients complain very much of the pain, most of them asserting that it is not more painful than the excavation of a very sensitive cavity.

Dr. Younger has implanted some two hundred teeth with, as far as he knows, some twenty failures. It is a pity, however, that this estimate of 10 per cent. of failures is not based on absolutely reliable statistics.

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* N. Y., 30th June, 1888: This tooth is still in place and as sound as the adjoining central.—F. C. Harmstad.

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It may not be uninteresting for you to know that the fee he charges for the operation is one hundred dollars for a bicuspid, and one hundred and fifty dollars for an incisor or molar implantation. The larger fee for the incisor is accounted for, not by any extra difficulty of the operation, but because of a greater difficulty of obtaining suitable teeth. The greatest number of implantations he has made in one month have been five, of which four were, I believe, contiguous. This case he describes as being still quite a success, and a source of continual gratification to the patient. His earliest operation, which dates back over three years, is still a success.

It must be remembered that Dr. Younger's special contention is that the life of the pericementum is capable of being resuscitated just as "mummy corn" retains its vitality for an indefinite length of time. This alleged analogy is somewhat unfortunate, for amongst botanists the statement as to the vitality of mummy seeds is as discredited as is the statement as to mummy gold fillings amongst dentists. A correspondent in "Nature," vol. 35, 1887, pp. 114, 463, 582, clearly shows that competent botanists do not accept the case of the germination of seeds taken from Egyptian tombs as authentic, and have universally condemned as utterly worthless the evidence given in support of alleged instances of the germination. The fruitful source of error has been the deception at the outset of the credulous experimentor by the Arab. One correspondent points out that the mummy wheat of one well-known traveller grew up in the form of *oats*—a plant not cultivated by the ancient Egyptians, but now grown in the land they inhabited—though this did not shake his faith in the genuine source of his supply.

All the operations which I have described to you have been cases in which he maintains he has availed himself of this vitality, and that in selecting a tooth for implantation he does not care how long it has been extracted, provided that the pericementum still invests the root, which he says a little experience always enables one to decide. In the case of the teeth implanted for Mr. Gartrell, which I only examined carefully *after* their removal from the mouth, I must say I could discover no evidence of pericementum. Professor Greenfield and other experts who have examined them support this view. They also agree with me in still refusing to accept Dr. Younger's theory as to the persistence of pericemental life.

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Teeth to be employed.—After deciding to adopt the operation of implantation, the first question one has to determine is whether it is better to employ dry teeth which have necessarily been out of the mouth some time, or those still invested with a live pericementum as in teeth recently extracted. The question of procuring the requisite teeth soon becomes a very serious and difficult one for the individual operator, and there can be no question that, from the point of view of supply, the feasibility of employing dry teeth may solve an otherwise insurmountable difficulty. The desire and hope of the operator is to procure a true physiological union, rather than a mere mechanical retention of the scion tooth in the artificial socket, and for a variety of reasons, which we will shortly discuss at greater length, the employment of teeth with a live pericementum, though presenting infinitely greater difficulties in the way of supply, would seem to offer better prospects of attaining that end.

While most of our American confrères, therefore, have followed Dr. Younger's later practice in implanting dry teeth, I have deemed it better to revert to his earlier, and I think better, practice, of employing only those with a live pericementum.

It must also be admitted that the use of teeth with a live pericementum necessitates much greater care in the handling of the scion teeth during the process of preparation, and also exacts a considerable expenditure of time when it may be ill afforded, since the dry specimens can be prepared at one's leisure. It is also easier to have a much larger choice of dry than of moist teeth, a point of considerable importance, since the space to be filled may be either abnormally wide or inconveniently narrow, but whereas the first appearance of the implanted dry tooth is extremely unsightly and unnatural, the use of the moist variety is attended with no disadvantage as to colour.

Of course in the unsurmountable absence of such a tooth, I would not hesitate to use one of the dry variety, since whatever may be our theory as to the process of retention, there is no doubt as to the fact that a large number of such teeth are doing good service after a sufficiently long period of trial.

Methods to be employed.—The instruments especially adapted to the operation are already somewhat numerous, including the Younger trephine, the circular knife of Rollins, and the crib knife of Ottofy. The pain dependent on the operation is no doubt greatly due to the nature of the instrument. From my own limited experience I think the easiest plan consists in boring a

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small hole representing the axis of the new socket, and then enlarging with rapidly cutting bone reamers with a guiding point to follow the first perforation. Instead of a sliding guide, as in the Younger instruments, to indicate the depth of the socket, I have had the drills themselves graduated which serves the same purposes and effects a saving of time. Messrs. Hallam & Son have succeeded in making these instruments from my rough designs, and from the experience of my last operation they promise well. These instruments should be employed in an engine without any spiral "wrist," and with a large and heavy driving wheel such as the old Bonwill engine. In order to facilitate the filling of the root canals, &c., of the scion tooth, and to preserve the pericementum from injury during that process of treatment, I have designed a simple holder which, by firmly grasping the crown and leaving the pericementum quite free, enables one to perform the necessary operations with the minimum amount of injury to this membrane.

Medium for the scion tooth.—As it is not always practicable to at once transfer the scion tooth to its new socket, and as the tissues no doubt do retain their vitality for an, as yet, unascertained limit of time, it is advisable to have some medium in which to keep the tooth moist and if possible aseptic. One naturally turned to those so-called normal fluids employed in the physiological laboratory, since when fresh they are said to cause very slight change in the tissue as they more or less resemble the fluids with which the tissues in the body are surrounded. These normal fluids are:—

(*a*) The aqueous humour of the eye.

(*b*) Blood-serum.

(*c*) Normal saline solution (.75 Na. Cl.).

(*d*) Iodized serum.

On consulting Mr. Langley, the well-known physiologist, he advised me rather against employing any of these, but rather to keep the teeth in plain water at a temperature just above freezing point as being most likely to prevent tissue and septic changes. It would therefore seem from this that the ingenious hot water bath, designed by Dr. Kirk for keeping the scion tooth in a sterilising solution at 103° F., is rather a disadvantage than otherwise where teeth with a "live" pericementum is employed.

As it is certain that many failures in replantation and transplantation were due to the teeth being ruined by lethal doses of carbolic acid, and as the refrigerative method is not always prac-

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ticable, no stronger solution than an, at most, two per cent. solution of carbolic acid, or a 1 in 2,000 solution of mercuric chloride, should be employed for keeping teeth for implantation purposes.

Notes on my own Cases.

Case I.—On the 26th November, 1887, in the course of a demonstration of immediate root filling in connection with my lectures on operative dentistry, to the students of the National Dental College, a man and his wife presented themselves as patients. The woman had only the two right upper incisors remaining and was wearing an artificial denture. The lateral incisor had recently had an elaborate and excellent gold filling inserted on its disto-palatal aspect by one of the students, while the other incisor was offered to me as a fit case for the demonstration. I considered it my first duty to point out to the students the lack of judgment displayed in devoting any, and more especially any prolonged conservative treatment in such a case as that, since it was obvious that the patient might have a more artistic and a more efficient artificial denture in the absence of the two remaining incisors. Such a case is only typical of many others of only too frequent occurrence in which radical treatment by extraction is more conducive to the permanent well-being of the patient than the conservative treatment by simple occlusion of a carious cavity or the more prolonged process of pulp or root canal treatment and subsequent filling. It is also typical of a large and constant source of supply of live teeth suitable for implantation, and yet altogether devoid of the moral objection which has already been advanced, and that with perfect justice, against the practice of certain practitioners who have in the past been guilty of an injustice and a wrong by becoming a party to a conspiracy by which one poor unfortunate individual was induced for a pecuniary temptation to part with a useful and essential tooth for the purposes of transplantation into the mouth of the dentist's wealthy patient.

On examining the mouth of the husband of this patient, it was found that the crown of the right upper incisor was completely gone and the root very considerably decayed and affected with a chronic alveolar abscess, evidently of long standing. After some little persuasion, both patients agreed to the following operations, by which the husband was enabled to remedy an unsightly defect

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in the front of the mouth by utilising the teeth lost by his wife, a loss which was in reality a distinct gain to her, both as regards function and appearance.

In order to effect this transference of the tooth, under the best possible conditions, and not merely for the purpose of giving the promised demonstration of immediate root filling, the putrid contents of the pulp chamber and root canal were immediately removed under rubber dam and mainly by the means of Morey's nerve drills. After syringing the canal with a one per cent. solution of mercuric chloride, the root canal was filled with oxychloride of zinc, and the crown cavity with phosphate cement. It was however allowed to remain in the mouth for three days in order to demonstrate, as it successfully did, the favourable result of such operative procedure, as well as to afford some little time for the cure of the chronic abscess at the root of the right upper central incisor of the husband, which was extracted on the evening of the 26th November.

On the morning of the 29th November, the central incisor was extracted from the mouth of the woman (aged about thirty-six) and kept until required in a weak solution of mercuric chloride (1 in 2,000).

On examination of the mouth of the man (aged thirty-seven), the abscessed condition of the socket of the right upper incisor was found considerably improved, though the gums generally were still in a much inflamed and unhealthy condition from considerable deposits of salivary calculus and the generally dirty condition of the mouth. The root of the scion tooth was very much larger than the root which had been extracted. It was, therefore, necessary to considerably enlarge the socket, so much so as to entirely remove the case from being one of transplantation to one presenting all the conditions and characters of implantation into an artificial socket. On examination (after extraction) the scion tooth showed unmistakable traces of having been abscessed. The periosteum of the upper third of the root was inflamed and thickened, while the extreme apex was denuded of periosteum and much roughened, thus presenting unmistakable evidence of previous absorption. No abscess sac, so called, came away with the scion tooth on extraction. The lower fourth of the root was completely denuded of periosteum, mainly from recession of the gums and absorption of the alveolus. The scion tooth was out of the mouth just about half-an-hour and was securely fixed into the

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socket, in which it loosely fitted, by a metal splint covering the two adjoining teeth, and secured in position by phosphate cement.

Subsequent examinations proved that the wounded socket healed quickly and without the slightest trace of suppuration. The splint was removed at the end of five or six weeks, when the tooth was found to be fairly firm. That firmness gradually increased until its condition is now described by the house surgeon of the National Dental Hospital as follows :—

"June 22nd, 1888 : Your first patient came up last week voluntarily to show me his tooth of which he is very proud and well he may be, for it is *quite firm* and *painless* with no pericementitis present."

Case II.—On the afternoon of the same day (29th November, 1887), I inserted the right upper lateral incisor from the woman mentioned in the previous case in the mouth of H. E. W., a medical student at Cambridge University, aged twenty-six, for whom I had been obliged to remove the partially absorbed remains of the lateral incisor fractured high up in the socket some years previously. The condition of the operating field is described in my notes as follows: "Inflammation from the irritation produced by the fractured tooth subsiding, and the lower part of the alveolus completely gone." The operation for this implantation consisted of the enlargement of the socket in its whole extent for the reception of the larger rooted scion tooth. In this instance, also, the scion tooth showed signs of slight apical chronic inflammation of the periosteum which was absent on the lower fourth of the root, as already described for its fellow in the previous case. It was transported from London in a weak solution of carbolic acid, not more than two per cent., while the root canal was filled out of the mouth, during which process the periosteum was carefully protected by being held in a double folded napkin kept wet with mercuric chloride solution (1 in 1,000). Six hours intervened between the extraction and the implantation of that tooth. It was secured with a thin gold splint fixed with phosphate cement, which was removed at the end of a few weeks. No further treatment was necessary except an endeavour that was made quite recently to induce the gum to grow a little further down on the lower part of the root which was devoid of periosteum. The implanted tooth presented a most natural appearance when last seen (June 8th, 1888), and I would especially call attention to this case, as it is a type of that too frequent disfigurement, a yawning

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blank in the front of the mouth, remedied in a way which every candid observer is bound to admit, is unequalled by any other known operation in dentistry. The only doubt as to the operation is as to its permanency, and experience alone can clear up that uncertainty. At present it promises well, despite the disadvantages of a scion tooth rather beyond the desirable age, and already beginning to undergo partial atrophy by the loss of the lower part of the periosteum and the consequent and undesirable exposure of a considerable part of the cementum, the least resistant of the dental tissues, when exposed to the vitiating fluids of the mouth. When this implantation does fail, apart from the possibility of repeating the operation by a further implantation, it will still be possible to apply any of the remedial measures generally adopted in such cases, which are probably only two in number, viz., (*a*) an artificial tooth with projecting wires built into cavities made in the at present non-carious contiguous teeth, an operation in any case which I should deem ill-advised from the uncertainty of its duration and the injury it must necessarily effect on the teeth of anchorage; (*b*) an artificial plate, inconvenient to wear and probably more or less injurious to the neighbouring teeth and the subjacent mucous membrane. The only future disadvantage to which the patient has been exposed is a very slight extra absorption of the alveolus than would otherwise have occurred. It may be also well to remark that this patient, like others, is now in no way sensible of the sentimental, and to many the insurmountable objection of having in his mouth a tooth of another individual, and he glories in the comfort that this tooth has been entirely free from the considerable pain and bother he has had with his other teeth.

Case III. was that of A. B. C., a healthy young barrister, twenty-three years of age, who had lost his first upper bicuspid in October, 1884. The absorption of the alveolus was therefore quite complete and the gum normal and healthy. The scion tooth was a left upper second bicuspid from the mouth of a healthy young lady, aged thirty, extracted in order to prepare the mouth for an artificial denture on the same day (2nd December, 1887). The root canal was filled in the usual manner, while the distal cavity was filled with amalgam and a cavity in the crown with gold. The periosteum seemed fairly healthy, but only covered about two-thirds of the root. During the three hours the scion tooth was out of the mouth it was kept moistened by

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a solution of mercuric chloride, 1 in 1,000. It fitted loosely into the artificial socket, and was fixed with a gold splint secured by phosphate cement. On the following day I refixed the splint in a way which further conduced to the comfort of the patient. The gum was slightly congested, but no pain was felt except on pressure of the implanted tooth, which was loose but not "wobbly," as immediately after implantation. No further treatment was necessary. The splint was retained for about five weeks, when it was removed and the tooth found to be fairly firm.

As it is usually supposed that the operation of implantation must necessarily be a very painful one, the following notes on the operation from this point of view jotted down by this patient at the time in his own words may not be without interest.

"Stage 1. Lancing gum and detaching periosteum from bone. Pain not very great.

"Stage 2. Making the socket. Very little pain at first, but it materially increased as the operation progressed.

"Stage 3. Implantation, &c. No pain. On the whole I had far less pain than I expected, and what pain I had, though sometimes severe, was never acute. There was none of that thrilling pain incident to the boring of a tooth."

The patient is so far satisfied with this operation that he intends very shortly having the corresponding tooth on the other side, which has also been lost for several years, replaced by a similar operation.

Case IV. was that of W. H. W., a healthy but rather nervous undergraduate, aged twenty-one, who had lost his left upper first bicuspid several years previously. The gum and alveolus was therefore in the same fully absorbed and healthy condition as in the previous case. The scion tooth was extracted with three others, on the 4th February, 1888, from the mouth of a healthy young lad, aged fifteen, for the purpose of correcting an irregularity, accompanied by interstitial caries. The root canal and crown cavity were treated as in the previous cases. From a naked-eye appearance, which for such a purpose may possibly be absolutely unreliable, a large part of the root seemed to be entirely stripped of periosteum. The scion tooth was out of the mouth about six hours, and was kept moist by a 1 in 2,000 solution of mercuric chloride. Owing to a slight curve in the scion tooth it was found to fit so tightly into the artificial socket on one of the

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trials, that it was thought a pity to remove it again. The case was accordingly dismissed without having it attached by any splint or even ligature. On inspecting the case nine days afterwards the scion tooth was found to be much looser than on implantation. The patient said that it was also slightly tender on pressure while eating, but did not otherwise give him trouble. On the 2nd March, just a month after the operation, the case was again inspected, and the tooth found to be much firmer again. When last seen (28th May, 1888), it seemed very firm, and in quite a healthy condition.*

CASE V. was that of J. H. G., a barrister, aged thirty-nine, who had lost his left upper first bicuspid more than ten years previously. The scion tooth was extracted on 4th February, 1888, from the mouth of the lad mentioned in the previous case. The root canal and crown cavity were treated as in the previous cases. To the naked eye the periosteum seemed fairly complete on the distal, and only partially so on the labial surfaces, while only slight patches were observable on the palatal and mesial aspects of the root. The scion tooth was out of the mouth over twenty-four hours, and was kept moist by a 1 in 2,000 solution of mercuric chloride.

Before undertaking to practise the operation of implantation on the living subject, I had taken the advisable precaution of practising the operation several times on the cadaver, during which I became painfully conscious of the danger of perforating the antrum. In the present case on syringing out the debris in the artificial socket, the non-appearance of the contents of the syringe excited suspicion, and on passing a probe there was no further doubt as to the existence of a perforation into the antrum. The socket was, however, practically complete, so the scion tooth was duly inserted, and held in position by a gold splint fixed with phosphate cement.

This case was under our direct personal observation for the next twenty-four hours, and I am glad to be able to state that beyond a slight sensation of fulness on that side of the face, no immediate disagreeable result followed the perforation into the antrum. In a few days the splint came away, and it was deemed better by

* Oct. 10th, 1888.—Re-examined this case; tooth perfectly firm, gum quite healthy, with good attachment all round the neck of the tooth, which is only distinguishable from the other teeth by its being slightly smaller, and by its having the crown considerably disked down to articulate with the lower teeth.

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Mr. Baldwin, who kindly took charge of the case, to retain the tooth by filling up the relatively considerable spaces between the implanted and the contiguous teeth by means of gutta-percha.

Mr. Baldwin, who with Mr. Charles Tomes inspected this case about the 20th June, 1888, writes as follows :—

37, CAVENDISH SQUARE, W.
June 25th, 1888.

MY DEAR CUNNINGHAM,—The tooth you implanted was very firmly fixed in its place, more rigidly in fact than the other sound teeth which had not been interfered with. The gum around it was normal in colour and hardness, and tightly applied to the neck of the tooth. The connection had all the appearances of being a vital one. The patient told me he had been using the tooth perfectly, freely and fearlessly for some little time. I had hoped the alveolar process would be rebuilt to some extent around the root, but of this there was no sign. The depression of the gum, caused by previous absorption, remained on each side of the root as at the time of the operation.

The explanation of the exceeding tightness of the tooth is, I think, that the root was actually gripped by the gradually contracting fibres of cicatricial tissue, which must, in the nature of the case, form the bond of union in these cases. I regret to say, that herein lies, to my mind, an indication of future failure. The cicatricial tissue will go on contracting, during which time the tooth will be very firmly held. The contraction will diminish the size and number of the blood vessels, and greatly reduce the vitality of the tissue. This tissue will then be very liable to absorption, as we know the *normal* connection of teeth is now-a-days, as shown by the frequency of premature loss of sound teeth. I cannot imagine a connection of this nature lasting efficient more than, say, about two years. Perhaps this is a pessimistic view of the situation.

Now about the complications you refer to. All the three molars are alive. On the gum high up between the roots of the first and second molars, is a flat sessile growth about one-third of an inch long. This growth contains the orifice of a sinus which discharges a very little pus. That is to say, a little pus can be detected in the orifice on first examining, but when that has been removed it is not possible to squeeze out any more. After a little difficulty, I got a very fine blunt probe to follow along a fistulous track in a direction horizontally inwards and backwards, but chiefly backwards. This track ran in the substance of the bone, but was lined with smooth easily-bleeding membrane. I could not feel any bare bone. I do not think the sinus had any present connection with the implanted tooth, nor do I think it had any connection with either of the three molars. The explanation of it is difficult, but on the whole I am inclined to think it is a fistula leading from the antrum. Whether its primary cause was the

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operation for implantation, it is impossible to say. I think the whole public and profession are indebted to you for giving implantation a fair trial. I do not think it necessarily a barbarous operation, if it proves a success, but, for my own part, I doubt the duration of the success being of sufficient length to make it worth while.

I am, yours sincerely,

H. BALDWIN.

CASE VI. was that of G. S. G., a healthy undergraduate of twenty-one, who had lost his first upper left bicuspid, which had been extracted several years previously. The conditions were quite normal as in several of the previous cases. On the right lower side of this patient's mouth the second bicuspid had erupted irregularly and was growing completely out of the arch of the jaw towards the cheek. By the loss of this entirely useless tooth, which was already decayed where it pressed against the other teeth, an irregularity was corrected, a source of certain disaster to the neighbouring first bicuspid and molar was removed, and a scion tooth was provided for the replacement of the lost upper bicuspid. The root canal and two carious cavities in the crown were treated as before. Owing to the difficulty of extraction of a tooth so placed, the periosteum was partially stripped off in the process. It was kept moist in the usual solution ($HgCl_2$—1 in 2000), and was out of the mouth one and a-half hours. Owing to the tightness with which the tooth fitted the artificial socket, no splint or ligature was required. On the following day the tooth was still firm and comfortable.

On the 8th June examination of the tooth showed the presence of a small sinus just above the margin of the gum. The patient stated that about a week or fortnight after the operation the tooth became very loose, but after continuing in that state for some days, it gradually got firmer again. It is now quite firm and satisfactory but for this sinus, which seems to be indicative of slight necrosis of the alveolus.

This is the only case which has required any subsequent treatment, which consisted in an injection of peroxide of hydrogen, and of mercuric chloride solution, and touching the margin of the gums with crystals of cupric sulphate. In this instance, too, the attachment of the gum on the distal surface seems very high up on the root, and is not nearly so satisfactory as in the other cases.

CASE VII. was that of A. A., an apparently healthy young

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woman, aged twenty-one, who had lost the right upper first bicuspid about a year previously. The scion tooth was a large right upper second bicuspid extracted in the morning, 7th August, 1888, the day of the operation. It was not a very suitable tooth (1) from its being so much larger than the patient's own remaining bicuspid, and (2) from the pericementum shewing signs of very considerable inflammation towards the apex and all down one side. It was, however, the best of the few teeth available, and as the operation was performed as a demonstration in connection with a Post-graduate lecture at the National Dental Hospital, a certain degree of urgency may be admitted. From the largeness of the scion root, the artificial socket had to be made unusually large and the alveolus very considerably cut away, especially on the palatal aspect. The root canal was treated and filled as usual through a carious cavity in the crown, which was afterwards filled with gold. The tooth was kept moist during this process by the solution (H_g Cl_2, 1 in 2000), in which it had been lying since its extraction, five hours previously. The large crown was cut down till it fitted tightly between the adjoining teeth and articulated with its antagonists.

Neither splint nor ligature seemed necessary. Mr. Lancaster, the then house surgeon, took charge of the case, on which he reports as follows: 9, vii. 88.—Patient has great pain, gum very much inflamed and surrounding tissue acutely sensitive to pressure. Tooth firm. Lin. Iodi applied to gums. 13, vii. 88.—Patient reports an increase of pain, which is now diminishing, since her last visit. Still much local inflammation and tenderness. Tooth loose. 14, vii. 88.—Pain still diminishing. Tooth ligated, unwaxed silk and mastic varnish application. When last seen the case was doing well.

Case VIII. was that of F. W. W., a schoolmaster of rather weak physique, aged twenty-seven, who had had the right upper canine and first bicuspid extracted some eight years previously for the relief of a crowded and irregular denture. The result of that needless operation was an unsightly gap, which marred the distinctness of his articulation. The scion tooth was extracted from the mouth of a healthy young girl, aged fifteen, for the relief of a crowded denture, on 15th August, 1888, and had been sent to me in a solution of mercuric chloride (about 1 in 3000). A large part of the root, involving the lower two-thirds of the labial surface, and extending to a considerable part of the distal and

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also slightly to the mesial surfaces, seemed entirely denuded of its pericemental membrane. During the preparation of the scion tooth, which was similar to that of the other cases, it was firmly held in a holder by the crown, thus obviating almost any manipulation of the pericementum. About 30 hours elapsed between the extraction and the insertion of the scion tooth. In the course of preparing the artificial socket, the floor of the antrum was perforated. The tooth fitted the socket so tightly that neither splint nor ligature was applied. On the third day after the operation the patient wrote to say that he was too unwell to keep his appointment for the following day. The pain commenced on the day following the operation, and was described as never having been so acute as to cause him much sleeplessness, but his "general feeling was one of complete inactivity and deplorable apathy." The tooth was already loose. On the fifth day after the operation the patient arrived with the firm intention of having the tooth removed. He referred the pain to the region of the antrum, and described it as being "dull and lasting rather than acute and intermittent." He had no pain in the implanted tooth.

On examination I found the tooth was extremely loose and all the neighbouring parts in an acutely sensitive condition from inflammation. The gum on the labial surface was covered by a layer of cast-off epithelium with one small ulcer a little higher up, while a slight swelling was noticeable opposite the root on the palatal surface. There was a distinct swelling of the cheek below the right eye which was red and watery. The cheek was slightly flushed and tender on pressure, especially towards the nose. The results of the following treatment are interesting both from its efficacy and from its relative novelty in dental cases. At 11.30 a.m. a hypodermic injection was made at the junction of the cheek and gum over the implanted tooth, of five minims of Dr. Hugueschmidt's antipyrin and cocaine hydrochlorate solution. The relief was both immediate and complete, and continued for fully an hour, when the patient became anxious at a slight return of uncomfortableness. At 1 p.m. twenty grains of antipyrin dissolved in water were administered internally, at 2.15 p.m. a second dose of similar strength, and at 5.15 p.m. a third dose of half that amount. Warm fomentations were applied for about an hour (3.30-4.30 p.m.). Meanwhile the tooth was fixed in a metal band splint with phosphate cement, and the patient left happy, com-

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fortable, and even quite lively. He has since reported that he has had absolutely no pain subsequent to his last visit, but that he is disappointed in the continued looseness of the scion tooth.

Rationale of the Process of Repair.

The amount of positive knowledge which serves to throw light upon the exact method by which implanted teeth are retained in their sockets is so very small that we must be careful to abstain from drawing any premature and dogmatic conclusions as to the process, or even processes of repair, for, since it has been ascertained that both "dead" and "live" teeth are retained in artificial sockets, the mode of retention need not necessarily be the same in both cases. An important factor in considering this question would undoubtedly be the persistent vitality of pericemental life; but, as already shown in discussing this theory of Dr. Younger's, it may be dismissed since it is not based upon satisfactory scientific data.

In support of my attitude on this question I am able to quote the important evidence of Professor Miller of Berlin, who, at the meeting of the American Dental Society of Europe in 1887, expressed himself as follows:—"Younger uses for the purposes of implanting, not unfrequently, teeth which have been for days, months, or even years out of the mouth, and believes that the pericementum of such teeth becomes revitalized, so to speak, when they are planted in living tissue. In this, I think, there can be no doubt that Younger is entirely in error. When a tooth has been out of the mouth so long that the pericementum has become completely dry, there can be little hope of restoring it to life again."

I think, then, we are justified in the conclusion that the pericementum, so far as vitality is concerned, has no special characteristics which differentiate it from any other connective tissue of the body, and it is therefore extremely improbable if not quite impossible that it should possess this so-called property of inherent vitality.

As however Dr. Younger's theory is receiving some considerable acceptance in America, even, we are told, by some whose names are familiar as noted microscopists, it may not be out of place to call attention to the fact that a belief in this theory is not at all essential to an explanation of the undoubted fact that the dry teeth, as inserted in this operation of implantation, do become

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perfectly firm in the mouth and are retained there for a very considerable time.

Mitscherlich, in an excellent and exhaustive paper on the "Replantation and Transplantation of Teeth," published in Langenbeck's "Archiv. für Chirurgie," Vol. IV., translated into English in Truman's "Archives of Dentistry," Vol. I., p. 169, after describing the results of transplanting dead or rather dried teeth from the corpse into the living subject, records the results of some experiments on animals which satisfactorily explains the mode of retention of such teeth. He took an upper incisor from a dog's skull and, after extraction of a corresponding tooth, pressed the tooth extracted into its place, fixing it by means of a silver wire passed through a hole in the tooth and the alveolar process. After six weeks the dog was killed, having been given during the last few days three grains of picronitrate of potash three times a day; the carotids were immediately injected. The muscles, like the gums, were coloured yellow; neither, however, in the implanted tooth nor in the sound ones was any alteration in colour perceptible. After removal of the silver wire the tooth was quite firmly seated, and could not be moved in the least by the fingers. The gums, as in the remaining teeth, were accurately applied both to the alveolar process and also to the tooth itself, and nowhere could any alterations be found in it. On longitudinal section the tooth was found everywhere most intimately connected with the surrounding parts, and suppuration showed itself nowhere. None of the injection had been forced into the pulp cavity, which presented no trace of the pulp beyond a little detritus. Of the periosteum there were only in a few places some small remains discoverable. On the posterior surface of the tooth two small cavities were visible, the larger of which lay more towards the point of the fang and extended to the pulp cavity; they were filled with a soft substance and their walls appeared roundish. These appearances were entirely confirmed by microscopical examination, inasmuch as only in a few places, especially on the anterior surface of the tooth, were traces of periosteum to be demonstrated; where this was absent the tooth was eaten away, and its absorption had proceeded in such a manner that a multitude of globular elements appeared on the section, resembling the fragments which we find in ivory pegs which have been bored into bones and retained in them a considerable time. In the two above-mentioned cavities the absorption had proceeded further and further, and had at

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last attained its above-mentioned extent. The cementum could still be demonstrated in certain places; it was, however, absorbed in the greatest part of its extent. In the cavities of the tooth substance, masses of bone were embedded; they were applied to the walls of the cavities without any kind of intermediate substance, and so held the tooth with such extraordinary firmness. This osseous deposit, which was directly connected with the alveolar processes, was freely traversed by blood vessels which sometimes extended themselves close up to the tooth substance. It was also so fully developed that the process had to be looked upon as fully accomplished, and therefore a later exfoliation of the tooth was not to be expected.

Certain experiments by Prof. Miller, though initiated for an entirely different purpose, serve to throw some light upon this very important subject. At the meeting of the American Dental Society of Europe before referred to, he remarks: "I have found by experiments on rabbits that the pieces of dead dentine may be retained and firmly held in living tissue by encapsulation. Small pieces brought under the skin or into the abdominal cavity *under aseptic* conditions soon became enclosed and firmly held in a dense capsule of connective tissue, and could not be removed without tearing the tissue. In all cases, however, resorption soon began forming irregular resorption-territories or cavities into which the tissue grew, thus forming another temporary bond of attachment between the dentine and the surrounding tissue. In one case, where the piece of dentine was left for 24 hours in putrid saliva, suppuration took place and the piece was thrown off.

"When pieces of dentine having living pericementum were used, an apparently permanent union with the surrounding tissue was formed, no resorption being evident after three months. I see no physiological reason why the implantation of teeth—where the alveolar process has been sufficiently preserved to enable one to obtain a normally deep socket for the tooth—should not show nearly as large a percentage of successes as transplantation. The operation should always be performed under antiseptic conditions, and, as far as possible, freshly extracted teeth should be made use of."—*Dental Record*, Nov. 1887.

In the *Oesterreichisch-Ungarische Vierteljahrsshrift für Zahnheilkunde*, Heft i., ii., iii., 1886, is an account of a long series of experiments made by Léon Fredel in replantation and trans-

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plantation of teeth in dogs. It appears from these experiments to be proved that the cavities of absorption only occur in teeth where they are unprotected by pericementum, and that the presence of pericementum is absolutely necessary for the formation of a firm and permanent union. It must be noted, however, that in these experiments the pericementum referred to is that of a freshly extracted tooth, and not one which has been "resuscitated" after a long sojourn out of the mouth.

The interesting and valuable experiments in replantation and transplantation of human teeth, made by Professor Stack, Dr. Baker, and Mr. Daniel Corbett, junr., are well worth careful study by those interested in the subject. The able paper* by Professor Stack clearly shows the real reason of failure in these operations, and further, the possibility of a reunion of the pulp with the tissues outside the tooth, a fact which may yet be of the utmost value in the operation of implantation.

These papers are of such scientific interest that I propose to refer further to them in a second paper, in which I intend to discuss experiments performed on animals with the special purpose of demonstrating the actual mode of union of implanted teeth.

The results of microscopical examination of human implanted teeth after removal furnish certain important, but not altogether satisfactory, data.

Case I. Andrew's Implanted Tooth.—"At a special clinic of the First District Society (N.Y., U.S.A.) held on October 15th, 1886, Dr. W. J. Younger implanted an inferior central incisor in the mouth of Dr. C. L. Andrews. This tooth has since been under continued observation by the chairman of your committee. It became very firm soon after being inserted, and changed its colour to conform to the other teeth, as they all do. It was a typical case of success and we have seen many experts deceived in picking out the implanted tooth. Dr. Andrews, a dentist himself, felt quite proud of the result, and everything pointed to a long-continued usefulness of the new member of his inferior maxilla. But about September, 1887, he first noticed that the tooth was getting a little loose. This he attributed to an injury received in eating corn, and ligated it and gave it every other attention; but it grew from bad to worse until, on February 21st, your chairman ex-

* Trans. of the Academy of Medicine in Ireland, 1883.

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tracted the tooth and immediately placed it in a weak solution of chromic acid. It was at once taken to the laboratory of Professor Carl Heitzman, and left with him for microscopical examination for the benefit of the report of this committee. Professor Heitzman gave the specimen his careful attention, and returned to us four of the best sections, and india ink drawings of two of them ready for publication. His report of the specimens is as follows:

"NEW YORK, April 8th, 1888.

"The root of the implanted tooth which you brought for examination a few weeks ago appeared to the naked eye reduced to about one-third of its original size. This reduction was caused by deep erosions and irregular cavities that have replaced the original tooth tissues, viz., the cementum and the dentine.

"After the tooth had been softened in a chromic acid solution, the root was cut into thin slabs, and the appearances, under the microscope, were as follows: The dentine is corroded almost around the whole periphery of the root. Only in one place can a trace of cementum be seen. The bordering line of the dentine towards the excavations is fluted and made up of crescentic lines corresponding to bay-like excavations, which follow in varying sizes in large numbers. The dentinal canaliculi, in which the dentinal fibres are still recognisable, terminate abruptly along the concave borders of the bays. Here and there apparently closed spaces of varying sizes are seen at the eroded borders of the dentine. Both the small and large bays and the spaces are filled with a myxomatous granulation tissue, in which numerous partly wide capillary blood-vessels run, mostly filled with blood corpuscles. In places where the bays are shallow a delicate layer of fibrous connective tissue is seen attached to the dentine. The myxomatous tissue holds in many places globular masses of lime deposits; and in some places are seen débris of dentinal tissues, with irregular, eroded contours still holding dentinal canaliculi and obviously having escaped dissolution. Along one surface the bays appeared to be filled with coagulated serum of blood, in which blood-corpuscles and isolated medullary corpuscles were suspended; here evidently hæmorrhage had taken place immediately before the removal of the tooth, that led to the destruction of the granulation tissue. The pulp chamber is lined mostly by primary dentine; a small portion, however, shows the formation of secondary dentine of the ordinary variety, with scanty and irregular canaliculi. Both the primary and secondary dentine border the pulp chamber with globular masses pierced by dentinal canaliculi, but showing nowhere excavations like those at the periphery of the root. Toward the apex of the root, where the corrosion of the dentine is most conspicuous, the pulp chamber has

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disappeared and the dentine is eaten away to such an extent that only thin ledges of it are seen. The process that has led to such an advanced destruction of the root is the same as that which brings about the absorption and destruction of the roots of temporary teeth before shedding. (Signed) DR. C. HEITZMAN."
—*Chicago Dental Review*, June 15th, 1888.

CASE II. YOUNGER'S TOOTH.—So far as I can gather this tooth had never become firm and was therefore removed. The result of the examination was somewhat similar to the above case, and a full detailed report of the results of microscopical examination by Dr. Heitzmann and Dr. C. F. W. Bödeker will be found in the *Dental Cosmos* for May, 1888.

CASE III. B.'s (CURTIS) IMPLANTED TOOTH.—This case is deserving of more particular attention, as it throws some light upon what may be termed a really successful case of implantation, although it was only in the mouth nine months. In the absence of reproductions of my diagrams, I have been obliged to condense Dr. Curtis's own account as follows :—

"On October 12, 1886, I successfully implanted a superior second bicuspid in the jaw of Miss B., aged twenty-five years. The natural tooth had been lost seven years before this operation, and the tooth implanted was extracted two days previous to its use by me. On July 23, 1887, I extracted the implanted tooth. It had been in active service for nine months without the slightest inconvenience to the patient, and without manifesting any unfavourable symptoms. The tooth was so firmly embedded that it was necessary to break it off, and split the root and remove it in sections. An anæsthetic was used, as the operation was necessarily painful. The socket was then deepened and a larger tooth implanted.

"On a recent examination the tooth was found to be firm, the surrounding parts in normal condition, and the stranger restored to actual life and health. The patient has the same full use of this as of its predecessor.

"The extracted tooth, consisting of crown and upper two-thirds of root was at at once placed in Müller's fluid (R. Potassic bichromate, 2½ parts; sodic sulphate, 1 part; aqua, 100 parts). After remaining in the solution a sufficient time, the tooth was decalcified, sections prepared and a microscopical examination made.

"Fig. 1 shows section of middle third of root; (a) representing where lower third was broken off; (b) showing spot where

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cementum was destroyed before implantation, or after implantation, during process of repair. The dentine is found to be in a normal condition, the fibres are not shrunken, and the whole presents an appearance of a like section of a freshly extracted tooth. Toward the lower part of root the cementum is greatly thickened and has become converted into a dense fibrous connective tissue, partially calcified. At another part this fibrous connective tissue has become converted into true bone, connected directly with the dentine fibres. So intimate is this connection that it is impossible to say where bone begins and the fibres of dentine end. This formation of bone contains bone-corpuscles and Haversian canals; one of the latter is shown.

"Another section is from a different level, and shows limit of root where broken off. In this section is seen no fibrous connective tissue as in Fig. 1; all is converted into bone. At one part is shown a transverse section of a Haversian canal with its concentric lamellæ.

"Fig. 3 shows same field as Fig. 1, more highly magnified, bringing into prominence the bone corpuscles, and showing the Haversian canal, with its concentric lamellæ. . . . .

"I may further say that, had the tooth subjected to experiment been unbroken, more points could have been proved. Had the tooth been whole, it could have been demonstrated whether the ossification extended to the entire length of the root. In my opinion it did. I believe that in this case the fixation of the tooth was caused by the reproduction of bone-tissue of the alveolus. The inflammation consequent to the formation of a socket produced an infiltration of osteoblasts or bone-corpuscles into cement-substance. The outcome of this process is bony anchylosis."—*Dental Cosmos*, May, 1888.

Professor Black, who examined the slides of Dr. Curtis' case, gave it as his opinion that what has been described above as bone is really a new layer of cementum. The original drawings from which my diagrams were made will be found in the two American dental journals just quoted.

In estimating the value of these three microscopical reports, it is important to bear in mind the condition of the scion tooth previous to implantation. In the first two cases no details have been given, but since both may be regarded as Dr. Younger's cases, and since we know his practice in such matters, we may conclude that they were both "dry teeth" which had been out of the mouth

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for some time. In Dr. Curtis' case, he informs us that the scion tooth was extracted two days previous to implantation. It is a pity that the further details as to this treatment in the interval, viz., as to the medium in which it was kept and as to the treatment of the pulp, have not been furnished. The interval during which the scion tooth was out of the mouth was sufficiently short to let us assume that it was a "live tooth," and thereby affording some explanation of the difference in results.

Even if, as is not improbable, certain cells in the area of inflammation take on absorptive action in every case, it does not necessarily follow that such action will advance rapidly or even continue slowly until the process is complete. Systemic nutritional power must be an important modifying factor. In favourable cases the "builders up" (osteo-blasts or cemento-blasts) may assume supremacy over the "breakers down" (osteo-clasts or odonto-clasts). If the recuperative power is feeble and the quality and quantity of the blood supply is poor, the absorptive process may run a rapid and destructive course. Systemic peculiarities and defective manipulation are no doubt the most important factors in inducing the final loss of the tooth by absorption of the root.

There can be no question, however, that no matter what the theories of Dr. Younger are, his success in practice commands our utmost respect for an operation whose introduction was hailed by the profession with a too general chorus of laughter and incredulity. A duration of little over two and a-half years in an operation like this is manifestly too short a period to enable us to come to a definite conclusion in the matter, especially when we remember that the process by which these teeth may fail in time —except, of course, those that have failed within the first few days or weeks—is usually a slow one. We fear that in the course of time a certain number of those temporary successes will, like their near relations, replanted teeth, fail by reason of the slow corroding effect of an absorbent organ. If our fears prove unfounded, so much the better for poor humanity.

It is evident that a satisfactory knowledge of the necessary conditions and the best lines on which to conduct the operation of implantation, can only be attained by detailed statistics of the experimental operations. The annexed Tabulated Abstract of Cases is an effort to fulfil that desideratum.

Meanwhile, we may, I think, safely adopt the following:

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General Conclusions.

I.—That in the present state of uncertainty as to the rationale of the process of repair, experiments on animals are desirable since they afford the only means of ascertaining the actual relations of the artificial socket to the implanted tooth.

II.—That so far the operation of implantation is practically a success—and that, whether "dry" or "live" teeth are employed—though it is as yet premature to measure that success in years.

III.—That the operation is only capable of limited application; but, in these special cases where it is applicable, the implanted tooth fulfils its function better than any other remedial treatment hitherto known in dentistry.

The President was at this point obliged to leave and the chair was taken by Mr. Turner.

Mr. Cunningham remarked that two of the best papers he knew on replantation and transplantation had been written by Dr. Stack and Dr. Baker, and were to be found in the transactions of the Royal Academy of Medicine of Ireland.

Mr. Street asked whether, in the event of the tooth to be implanted being found not to fit the socket, it could be modified. If he remembered rightly the fangs of the bicuspid, which they that day saw implanted, were bifurcated. Could not the bifurcation be cut off, so as to shorten the tooth, and would not such an operation lessen the chance of perforation of the antrum.

Mr. Cunningham: Yes.

Mr. Balkwill observed that a good many years ago—before the meeting of the Medical Congress in London—the question was discussed as to replantation and transplantation, and he pointed out that absorption was of very frequent occurrence in such cases. A case came under his observation in which a tooth was placed in a bad position, in a young fellow's mouth. They tried to rotate it; it was very flat in the root, and in the process of treatment it was extracted. In order to give it a right position the root was filed before the tooth was put in again. After two years it came out, and it was found that absorption had taken place, and that it was entirely on the surface that had been filed; showing that where there was interference with the periosteum absorption took place more readily than elsewhere.

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Mr. Coffin hoped that in the interest both of patients and the profession, operations such as they had that morning seen would not be performed under such enormous disadvantages as Mr. Cunningham had laboured under in the case in which he operated.

Dr. Stack said it was not to be expected that an operation of this kind, which was in its infancy, would at the outset be performed so skilfully as it would be after operators had become more familiar with it. From the time Mr. Cunningham had taken it up, he (Dr. Stack) knew that he had devoted the greatest attention to preserving the vitality of the periosteum. To his (Dr. Stack's) mind, the most interesting feature of the question was that very matter of retaining as long as possible the vitality of the periosteum. Mr. Cunningham, as he understood, not only submitted it to chemical reagents, but was most particular about the temperature in which the scion tooth, if he might so call it, was kept. When they saw an operator take such pains as he did about each step of the operation they began to think that the statistics of an operation of the sort should be made up, not from cases in which the thing was done carelessly, but from those in which it was done with the most absolute care and punctilious regard to all the minute matters on which depended the success or failure of an operation. There were several of Mr. Cunningham's patients in whom the operation had been a complete success, and all had been accomplished that he expected from it.

Mr. Alford enquired whether Mr. Cunningham apprehended any evil results from hereditary taint in the constitution of the persons from whom the tooth was extracted.

Mr. Baldwin said he had the pleasure of seeing Mr. Stack operate in three cases. He (Mr. Baldwin) examined two of them some months afterwards, and he found the implanted teeth firmer than any of the others. Some people thought that the union that took place was due to ankylosis, but he did not think so. He believed that the tooth was held by a contraction of the cicatricial tissue. There might be a risk of perforating the antrum, but in the case of the six front teeth there was no danger of that casualty.

Mr. Lloyd Williams said he wished Mr. Cunningham had given them a little more information as to the pathological changes that took place in connexion with the union of the implanted tooth. It could be understood that in cases of replantation and transplantation, a portion of living dental periosteum

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TABULATED ABSTRACT OF CASES OF IMPLANTATION.

No.	Name.	Age.	Sex.	Tooth.	When lost.	Condition of Operating Field.	Operation.	Scion tooth.	Age.	When extracted. Day.	When extracted. Hour.	Preparation of.
1	R.A.K.	37	M.	R.U.I.	26. xi. 87.	Chronic abscess; gums much inflamed; dirty mouth.	Enlarged the socket to fit larger rooted scion tooth.	R.U.I. of his wife.	35	29. xi. 87.	10 a.m.	Root canal and cavity stopped while in the mouth on 26. xi. 87.
2	H.E.W.	26	M.	R.U.I.	22. xi. 87.	Inflammation subsiding from irritation of fractured tooth; lower part of alveolus gone.	Enlarged and widened socket in whole extent for reception of larger rooted scion tooth.	R.U.I.$_2$	35	29. xi. 87.	10 a.m.	Perios. protected by napkin, root canal filled out of mouth; napkin wet with Hg. Cl.$_2$ (1 in 1000)
3	A.B.C.	23	M.	L.U.B.$_1$	x. 84.	Gum healthy; absorption of alveolus complete.	Making artificial socket.	L.U.B.$_2$	30	2. xii. 87.	1 p.m.	Root canal filled out of mouth as above; distal cavity A.; crown G. stopping.
4	W.H.W.	21	M.	L.U.B.	Several years	Ditto.	Ditto.	R.L.B.$_1$	15	4. ii. 88.	12-30 p.m.	Root canal as above, ARs. in crown.
5	J.H.G.	39	M.	L.U.B.$_1$	10 years (over)	Ditto.	Ditto.	L.U.B.$_1$	15	4. ii. 88.	12.30 p.m.	Ditto
6	T.S.G.	21	M.	L.U.B.$_1$	several years	Ditto.	Ditto.	R.L.B.$_2$	21	7. iii. 88.	—	Root canal as above, 2 G stgs. in crown.
7	A.A.	21	F.	R.U.B.$_1$	1 year	Ditto.	Ditto.	R.U.B.$_2$ (large)	From man 26 years	7. vii. 88.	11 a.m.	Root canal and carious cavity filled with oxychloride and phos. cement out of the mouth.
8	F.W.W.	27	M.	R.U.B.$_1$	R.U.C.& B.$_1$ about 8 years ago	Ditto.	Ditto.	R.U.B.$_1$	Girl aged 15	15. vii. 88.	—	Root canal and pulp cavity filled from the crown, Hg. Cl.$_2$ % Ω and G stg.

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No.	Condition of Pericementum.	How kept.	Interval of time.	How fixed.	Complications, Results and Remarks.	Last seen.
1	Apical inflammation, $\frac{1}{3}$ of root covered	Hg. $Cl._2$ 1 in 2000	$\frac{1}{2}$ hour	Metal splint phos. cement.	Scion tooth had evidently been abscessed, thickened periosteum towards apex; sac left, rough absorbed point at apex.	7. vii. 88.
2	Slight apical chronic inflammation; $\frac{1}{3}$ of root covered.	Carbolic Acid about 2 %	6 hours	Metal splint phosphate cement.	.....	vi. 88.
3	Healthy but only $\frac{2}{3}$ covered.	Hg. $Cl._2$ 1 in 1000	3 hours	Ditto	3. xii. 87.—Removed splint for alteration and re-fixing; gum congested; no pain except on pressure; tooth loose, but firmer than on implantation; no after treatment necessary	24. viii. 88.
4	Large part of root stripped of periosteum.	Hg. $Cl._2$ 1 in 2000	6 hours	No splint nor ligature necessary	Owing to a curved root, the tooth fitted so tightly at one of the trials, thought it a pity to remove it again. 23. ii.—Tooth looser and slightly tender on pressure in eating. 2. iii.—Firmer again; no treatment; 19 days after the operation the tooth was found to be loose, but when seen again, one month after the operation, was quite firm and in a healthy condition.	10. x. 88.
5	Periosteum fairly complete on d., partially on l., and very little on m. surfaces.	Ditto	24 hours	Metal splint phos. cement.	Antral perforation.—About a week or ten days after a swelling developed over the molars, and later a fistulous opening over the L.U.M.$_2$	24. xii. 88.
6	Periosteum partially stripped off in difficult extraction.	Hg. $Cl._2$ 1 in 2000.	$1\frac{1}{2}$ hours	No metal splint nor ligature.	8. iii.—Tooth firm and comfortable. 8. iii. 88.—Patient reported; tooth at first very firm, three days after bit rather hard on it; tooth remained loose for some time and then got firm again. About three weeks after again bit hard on it, tooth again loosened so that he thought it would come out. It then rapidly tightened and has remained so; does not notice any difference between it and his other teeth, it has not caused any pain, only incidental annoyance from looseness.*	8. vi. 88.
7	Periosteum intact; very much inflamed towards apex and especially on one side	Hg. $Cl._2$ 1 in 2000.	5 hours	No splint nor ligature necessary but was afterwards (14. vii.) ligatured.	9. vii.—Considerable pain and inflamed. 13. vii.—Less pain; tooth loose. 14. vii.—Pain disappearing; tooth tightened with silk varnished with mastic.	x. 88. 88.
8	Large patch (lower $\frac{2}{3}$ of labial surface extending to the distal surface) seemed denuded of periosteum	Hg. $Cl._2$ 1 in 3000 (about).	30 hours (about).	No splint nor ligature necessary. 21. viii. applied splint with II Ah.	18. viii.—Tooth getting loose and considerable pain present, both conditions increased to maximum on 20th, eased with fomentation. 21. viii.—Patient in very bad state, came to have the tooth extracted; 11.30, injected ♏ V. of antipyrin cocaine solution, immediate relief; 1 p.m., 20 grs. antipyrin internally; 2.15, 20 grs.; 5.15, 10 grs.; patient feels quite lively (fomentations continued for an hour, 3.30-4.30).	†

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would still be adherent to the cementum, and that it might become united to periosteum still existing in the socket to which it was transplanted. But with regard to what was termed implantation, where the tooth was planted into the socket of bone and not of periosteum, he would ask how the wonderful union which had been described took place. They knew that strange things happened in the body—that a portion of the metal of a bullet had been known to become encysted in such a manner that no mischief was set up—but he had never heard of any surgeon trying to make good a deficiency in the human frame by inserting a portion of metal into it in the hope that encystment or some peculiar union would take place. He (Mr. Williams) was sorry to be in discord with other speakers, but he felt rather sceptical about the operation of implantation as described. He believed it to have certain risks, which would in future quite cut it out from the region of practice. Did Mr. Cunningham consider it a vital point in the operation of implantation that the pulp should be removed? If he removed it, did he replace it by any other material; and if he allowed it to remain, did any particular pathological conditions ensue? Would the end be sealed over by any deposit of fibrine of any sort; and was there any risk of suppurative action being set up by the decomposition of tissue?

A MEMBER said a gentleman who was present at the International Congress had had two teeth implanted by Dr. Younger, of San Francisco, and one of them remained only ten days in, and these were not old dead teeth, but had been taken out of the mouths of other persons, within a historic period of two or three years. There were many cases on record in which central incisors had communicated with the antrum, and it was patent that any tooth might reach it, although the perforation generally took place only in the case of bicuspids and molars. He believed the risks of the operation to be considerably under-estimated. They had not yet killed anybody by pyæmia; but if they went on with the operation they might.

Mr. ROGERS was of opinion that implantation was a wonderful stride in practice, and he saw no objection to it save that it inflicted a fair amount of pain on the patient—not more, however, than was involved in various other dental operations.

Mr. CUNNINGHAM (in reply) said his paper contained full details on all the points that had been touched on in the discussion, and

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he might mention that if Mr. Gartrell had not given himself for the demonstration that morning, he would have been his patient for implantation. The difficulties under which he had that morning performed the operation prevented the case from being a fair test. It was an operation worthy of being tested, because the resources of the profession had been taxed in order to find out some operative manipulation that would fill up the blank that implantation filled. In America all kinds of devices had been resorted to for the purpose; but he believed that in the cases suitable for it, no known operation answered so well as implantation. The fact that the patient he that day operated on was shortly afterwards able to eat luncheon, proved a great deal. The answers to all Mr. Lloyd Williams' questions were in his (Mr. Cunningham's) paper. He thanked the meeting for the attention with which they had heard him, and said they could all assist him by sending him teeth.

The CHAIRMAN (Mr. Turner): Gentlemen, it would be a dereliction of duty on my part and indecorous on yours, for us to break up without a few words from me. We are now at the end of our two days' work. Those who have attended the meeting will, I am sure, look back with satisfaction on the time they spent at it; and if they have been at all attentive to the proceedings they must have acquired a considerable amount of useful information. The question we have had brought before us during the last hour would of itself have repaid a visit to this Meeting. It is a question which has various phases of surprise in it, and which comes well within the field of scientific discussion. That the operation in question will ever assume anything like practical utility is a matter which, to my mind, and I think to the minds of many others, is very doubtful. At the same the most doubtful things sometimes surprise us by turning out far better than we anticipated, and perhaps most satisfactorily. With these remarks, and thanking you, gentlemen, for the attention you have given to our business, and expressing a hope that we shall all meet again next year with renewed energies, and I hope with renewed curiosity to hear the results, during the intervening twelve months, of Mr. Cunningham's experiments, I have to bid you farewell. I have to thank the gentlemen of the Press for their arduous labours in supplying our proceedings to their newspapers, and I also thank the Press of the City of Dublin for the manner in which they have noticed our meetings.

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Afternoon Tea with the Irish Reception Committee.

At five o'clock those members and their friends who were not detained too late at the demonstrations attended at an afternoon tea provided by the Reception Committee at 35, Molesworth Street (the rooms of the Dublin Art Club), where in addition to the afternoon tea they had the opportunity of examining at their leisure the pictures that had been lent or offered for the Benevolent Fund by members of the Dublin Art Club and by members of the Association. This exhibition was certainly the largest that has been brought together at an annual meeting, and here again Mr. Pearsall was to the fore with the brush as elsewhere with the pen.

Dinner in Hall at Trinity College.

At 5.50 precisely a limited number of members met to accept the kind hospitality of the Provost and senior Fellows of Trinity College. In the absence of the Provost the chair was occupied by the accomplished and genial Dr. Haughton, who proved in every sense of the words "a host in himself."

The Conversazione.

At 8.30 the members and their lady folk and all friends who were interested in the meeting met together at a conversazione in the Royal College of Surgeons. Although nearly a thousand guests assembled the Reception Committee had made such excellent arrangement and disposition of the space at their disposal that hardly any crowding or inconvenience was experienced by anyone. Among the guests were—

Archbishop Plunket, Lady Plunket and Miss Plunket; Lord and Lady Talbot de Malahide, Sir George and Lady Porter, Sir E. Hudson Kinahan, Lady and Miss Hudson Kinahan, Lady Ferguson, Sir

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Robert and Lady Ball, Sir Richard and Lady Martin, Sir William, Lady and Miss Kaye; Dean of St. Patrick's, Miss West, Miss C. A. West, Sir Fenton Hort, Sir Ralph Cusack and the Misses Cusack, Sir George Moyers, Lambert, and the Misses Moyers, Mr. and Mrs. Maziere Johnston, Sir J. Mackey, Lady and the Misses Mackey, Dr. and Mrs. R. Browne, Rev. Canon Bagot and Mrs. Bagot, the Provost and Miss Salmon, Sir Andrew Hart, Rev. G. and the Misses Carson, Rev. T., Mrs. and the Misses Stack, Rev. Dr. Haughton, Mrs. W. Haughton, Rev. and Mrs. Conner, the Misses Conner, Rev. J. W., Mrs. and the Misses Stubbs, J. R. Ingram, Mrs. and the Misses Ingram, Rev. H. Poole, Mrs. and the Misses Poole, Dr. and Mrs. Bewley, Sir Patrick and Lady Maxwell, Dr. and the Misses Shaw, T.C.D.; Rev. J. and Mrs. Barlow, T.C.D.; Mr. and Mrs. Williamson, Mr. Abbott, Miss Maxwell, Messrs. Maxwell, Surgeon-Major and Mrs. Dorman, Captain and Mrs. Stewart, Rev. T. T. and the Misses Gray, Rev. J. P., Mrs. and Miss Mahaffy; Dr. Traill, T.C.D.; Mr. and Mrs. George Fottrell, Captain and Mrs. Langford, Dr. and Mrs. Tarleton, Mr. and Mrs. Palmer, Rev. Ronald and Mrs. MacDonnell, Mr. and Mrs. Tyrrall, Mr. Cathcart, T.C.D.; Mr. and Mrs. Burnside, T.C.D.; Archdeacon Walsh, Mrs. and the Misses Hamilton-Jones, Dr., Mrs. and Miss Carte; Mr. M'Cay, T.C.D.; Mr. and Mrs. Panton, Mr. and Mrs. Fitzgerald, Mr. F. Purser, T.C.D.; Mr. Maguire, T.C.D.; Mr. and Mrs. Hutton, Captain and Mrs. Riall, Dr. and Mrs. Hawtrey Benson, the Messrs. Carte, Judge and Mrs. Waters, Mr. L. C. Purser, T.C.D.; Mr. and Mrs. Roberts, Mr. and Mrs. Culverwell, Rev. Mr. and Mrs. Bernard, Mr. and Mrs. Bury, Col., Mrs. and Miss Rowley, Dr. J. R. Kirkpatrick, Dr. Kough, Mr. O'Sullivan, T.C.D.; Mr. and Mrs. Beare, T.C.D.; the Misses Chambre, Major-General and Mrs. Browne, Dr. and Mrs. Macnamara, the Misses Macnamara, Captain Macnamara; Rev. Dr., Mrs. and Miss Gwynne; Judge and Mrs. Webb, Dr. and Mrs. Hamilton, Dr. and Mrs. W. Smyly, Dr. Cronyn, Dr. and Mrs. Bewley, Dr. and Mrs. Leech, Mr. and Mrs. Dowden, Professor and Mrs. Stokes, Dr. Kirkpatrick, Professor Goodman, T.C.D.; Mir Aulad Ali and Mrs. Aulad Ali, Rev. Dr. and Mrs. Jeremy, Dr. and Mrs. Arthur Baker, Rev. M. Flood, Dr. and Mrs. M'Cullagh, Mr. and Mrs. George Drury, Dr. Fitzgerald, Mrs. Rochfort Wade, Mr. and Mrs. Fetherston H., Dr. and Mrs. O'Carroll, Dr. Purefoy, Dr. and Mrs. Scott, Mr. Angelo Fahie, Dr. Horne, Dr., Mrs. and Miss Cruise; Dr. and Mrs. Blyth, Dr. and Mrs. Hayes, Mr. and Mrs. Jonathan Hogg, Dr., Mrs. and the Misses Melden, Dr. C. Wood, Dr. J. J. M'Mahon, Surgeon-Major and Mrs. Devlin, Captain and Mrs. Patrickson, Major and Mrs. Gibton, Dr. and Mrs. Nixon, Mr. and Mrs. Catterson Smith, Captain and Mrs. Fox, Mr. and Mrs. Maunsell, the Misses Maunsell, Mr. J. Maunsell, Mrs. and the Misses Milner, Canon Dillon, Dr. and Mrs. Kidd, Dr., Mrs. and Miss Patton; Dr. and Mrs. Baxter, Dr. and Mrs. Scriven, Dr. and Miss Barker, Dr. and Mrs. Corley, Mr., Mrs. and Miss Pim; Mrs. Goodrich Shedden, the Misses Wharton, Dr. and Mrs. Conolly Newman, Dr. and Mrs. Reid, Mr. Justice Andrews and Mrs. Andrews, Monsignore Lee, Dr. and Mrs. Armstrong, the Dean of Kilmore, Mrs. W. Stone, J. Malcolm Inglis, Mrs. Inglis, G. Stuart Inglis, Mr. and Mrs. Colles, Deputy Surgeon-General and Mrs. Whittaker, Rev. H. and Miss Johnston, Rev. A. Plunkett, Mr. L. C. Purset, the Bishop of Clogher, Mrs. Stack, Dr. and Mrs. Burke Kennedy, Dr. and Mrs. M'Ardle,

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Mr. Glynn, Mr. and Mrs. Skipworth, Captain Acland Troyte, Mr. and Miss Lane Joynt, Dr. and Mrs. Mayne, Mr. and Mrs. J. Dallas Pratt, General and Mrs. Lyons Montgomery, Dr. and Mrs. Byrne, Mr. and Mrs. Harrel, Dr. and Mrs. Dunne, Dr. Pollock, Dr. and Mrs. Gogarty, Dr. and Mrs. Harley, Dr. and Mrs. Moore, Dr. and Mrs. J. T. Arlidge, Mr. and Mrs. O'Grady, Rev. W. Brady, Dr., Mrs. and the Misses Ingram; Dr. Purefoy, Mr. Henry Yeo, Mrs. Henry Yeo, Rev. H. and Mrs. Noyes, Mr. and Mrs. David Sherlock, Lord Justice Fitzgibbon, Mrs. and Misses Fitzgibbon, Mr. Robert H. Moore, Miss Moore, Mrs. Underwood, Mr. and Mrs. George Coffey, Mr. and Mrs. Fane Vernon, Rev. C. W. Welland, Rev. J. A. Brannan, C.C., Mr. and Mrs. F. E. Du Bedat, Mr. and Mrs. H. Waterhouse, Mr. and Mrs. T. G. Waterhouse, Mr. and Mrs. Binden Stoney, Mr. and Mrs. Milo Burke, Dr. and Mrs. Edgar Flinn, Mr., Mrs. and Miss Findlater; Mr. and Mrs. George Morris, Mr. and Mrs. Gibson Black, Major-General and Mrs. Browne, Dr. and Mrs. Nedley, Mr. Ambrose Plunket, Dr. M'Dermott, Mr. W. Findlater, Mr. C. Findlater, Rev. E. Mathew, Dr. and Mrs. Gunn, Dr. and Mrs. Theodore Stack, Colonel and Mrs. Mayhew, Dr. and Mrs. O'Neill, Canon and Mrs. Twigg, Dr. and Mrs. H. Tweedy, Rev. T. V. Abbott, Dr. and Mrs. Thornley Stoker, J. J. Andrew, M. Alexander, J. S. Amoore, W. B. Bacon, J. James Bailey, M. J. Bloom, F. H. Balkwill, W. George Beers, J. Charteris Birch, John T. Browne-Mason, Storer Bennett, A. W. W. Baker, H. Baldwin, George Brunton, Henry Blandy, Thomas Balcomb, John A. Biggs, J. R. Brownlie, Thos. Buckley, Thos. Broughton, Charles Browne-Mason, George Cunningham, J. F. Corbet, C. M. Cunningham, W. C. Corbett, Jno. C. Clarke, F. Canton, Geo. Campion, Donald R. Cameron, Walter Campbell, J. S. Crapper, Walter Coffin, J. F. Cole, Stephen A. T. Coxon, F. Dale, Thomas Dilcock, J. Dennant, R. C. Drabble, Louis J. Egan, W. H. Elwood, W. M. Fisher, H. P. Fernand, W. Finlayson, Frank Albert Franks, Wm. Fothergill, J. N. Fothergill, Frankland Gaskell, John Greenfield, Thos. Gaddes, H. N. Grove, J. H. Gartrell, D. Hepburn, J. J. Holford, Edwin Houghton, W. E. Harding, S. J. Hutchinson, Richard Harrison, F. E. Huxley, W. A. Hunt, J. Harrison, R. Hazelton, W. Helyar, A. J. Jones, Alfred Jones, M. Johnson, J. F. Kekewick, Wm. Kelly, Amos Kirby, T. E. King, H. J. Kluht, Roff King, R. F. H. King, R. P. Lennox, G. H. Lodge, W. Ladyman, George M. P. Murray, Henry B. Mason, Leonard Matheson, Gavin Martin, John M'Stay, G. C. M'Adam, W. Bowman MacLeod, J Mummery, J. N. Manton, H. Mallett, A. A. Matthews, Thos. Mansell, J. H M'Call, Charles Merilees, Breward Neale, J. H. Osborne, H. O'Keeffe, Patrick O'Meehan, J. Lee Pike, Geo. W. Parkinson, W. M. Penfold, James Petherbridge, Rees Price, R. Payling, W. Booth Pearsall, J. Renshaw, W. A. Rhodes, S. G. Reeves, T. W. F. Rowney, Richard Rogers, Charles F. Rilot, Claude Rogers, C. Robbins, Charles Rippon, Thos. Read, Geo. H. Street, Charles Stokes, Alfred Smith, Charles Sims, Morton Smale, John Stirling, J. W. Senior, R. Theodore Stack, John Smith, J. Chas. Storey, Samuel Smyth, James Stocken, Martin Sherwood, D. McG. Smith, J. S. Turner, Joseph S. Thompson, Chas. S. Tomes, A. S. Underwood, A. B. Verrier, W. A. Vice, W. H. Williamson, John G. Wallis, Sidney Wormald, Joseph Walker, Arthur J. Watts, J. Charters White, Charles West, Hubert Williams, E. H. Williams, George H. Whittaker, Andrew Wilson, W. Somerville Woodiwis, W. H. Woodruff, R. H. Woodhouse, E. Lloyd Williams, G. W. Yeates.

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During the evening the Dublin Quartette Union, ably represented by Messrs. A. Williams, W. S. North, B. H. Mullen, and C. Kelly contributed some very perfect quartet singing in the board room, which was used as a concert hall for the occasion, while in an adjoining room during the intervals of the vocal music, the Royal Irish Constabulary band "discoursed" instrumental harmonies. This room presented a very strange appearance, for it so happened that it was the proper home and abode of certain osteological specimens. Behind the conductor stood the skeleton of a huge fossil elephant apparently all attention, and undismayed by the outbursts of a big trumpet; a little to one side the bony remains of some long-forgotten bird of the stork tribe looked with a half coquettish air at the unconscious bassoon, while in a dimly lighted corner a graceful form with dainty slippers sat listening to some member, who was telling no doubt of some antediluvian wonders, while behind them towered a huge kangaroo, its bony form apparently about to leap upon the unsuspecting *tête-à-tête*, to the infinite amusement of two human skeletons, whose knees looked as if they had given way in a paroxysm of laughter.

The library was thrown open and some choice specimens of illustrated books lay upon the tables for inspection, and the other rooms and galleries afforded every facility for movement and conversation, so that notwithstanding the large number of visitors there was none of the stifling heat and crushing that so often mars the pleasure of these sort of gatherings.

Refreshments were served in the Albert Hall during the evening.

After the Conversazione a large number of gentlemen repaired to the rooms of the Dublin Art Club to enjoy a quiet smoke and gossip over the events of the meeting.

Here, under the auspices of Mr. Bowman Macleod of Edinburgh, assisted by Mr. Rogers of Cheltenham and others, the raffle of pictures for the benefit of the Benevolent Fund was concluded, and the lots drawn. This raffle was a capital idea which owed its origin to the fertile brain of Mr. Booth-Pearsall. 540 tickets at 2s. 6d. were disposed of, and realised the substantial sum of £67 10s. for the charity. The names of the winners which have been kindly forwarded to us by Mr. Macleod, we publish for the convenience of members who may have been fortunate enough to secure prizes.

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No. in catalogue.	No. of winning ticket.	Artist.	Winner.
19	229	Joseph M. Kavanagh	D. Corbett.
20	72	W. Booth-Pearsall	J. McStay.
27	249	C. S. Tomes...	G. McAdam.
54	158	Mrs. Well-Robinson	J. F. Corbett.
61	348	P. H. Miller...	R. Holmes.
82	3	W. F. Osborne	J. Biggs.
99	21	W. Booth-Pearsall	Morton Smale.
100	134	S. A. Armstrong	D. Corbett.
102	423	E. L. Hanlon	A. Smith.
103	86	H. J. Hanlon	Miss Greenfield.
109	505	W. Booth-Pearsall	W. H. Woodruff.
115	133	C. S. Tomes...	C. West.
116	174	E. L. Hanlon	J. S. Amoore.
125	60	W. Booth-Pearsall	H. P. Fernald.
155	188	Grace Hastie	F. Canton.

After the drawing of lots there was more talking and smoking, and at a late hour the company separated for the night.

Saturday, August 25th.

THE VISIT TO GUINNESS' BREWERY.

Just as we were about to attempt a description of this interesting excursion a letter reached us from a mysterious correspondent who signs himself "Stout and Mild," and which we print even at the risk of being asked to resign our editorial functions in consequence. It runs as follows:—

"So excellently were the arrangements, both for the more serious work and the pleasures of the British Dental Association, dovetailed, that after the evening conversazione, which lasted until past midnight, and was followed immediately by the early morning festivities at the Arts Club, one had time, perhaps hastily, to change one's clothes, hail an outside car, and if not too much occupied in holding on have a refreshing nap *en route*, and arrive in time at 9.45 a.m. to see all that was to be seen of the King of Breweries before the hour when the special train was to start for the Howth excursion.

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"Nothing could exceed the courtesy of the gentlemen who conducted the members of the Association through this colossal establishment. Their kindly greeting and interesting explanations of the malting and brewing processes so pleasantly given will long be remembered by all who had the good fortune and privilege of being able to avail themselves of this invitation.

"Outside the doors stood a little group of dejected members watching their friends enter. When asked why they were so sad they said they had in the hurry of changing clothes forgotten to bring their tickets, but a bold spirit, leaping from an outside car, said he too had forgotten *his* but he meant to try and get in in spite of this awful neglect. The others, pale and trembling, trying to assume a boldness they knew not of, followed on his heels to face the official whose duty it was to collect the cards. His kindly reassuring words as he admitted them all without question were too much for some of the weaker ones. It is said they shed tears. These, however, were soon dried when the erring members found themselves, with a huge concourse of their fellows, inside the friendly portals and veritably 'all among the barley.'

"It might have been interesting from a purely one-sided point of view, to have witnessed the brewing process in one of its more primitive forms. Such, for instance, as that in which the maize malt is ground between the well articulated molars of the South American Indian, and when fairly saturated by the secretions of his salivary glands, is transferred from this natural mash-tub to stone jars where, mixed with hot water, it is allowed to ferment at its leisure; but this was not to be. Here science had stepped in with all her appliances, to elevate the art to its highest state of refinement.

"In companies of twenty, the members of the Association, and their friends of both sexes, were led off by courteous guides holding high office in the establishment, and were initiated into all its mysteries. Mysteries there were, sufficient even to satisfy a modern romance writer. Indeed, the wanderings of Rider Haggard's mysterious 'She,' in the bowels of her rocky African fortress, or of Virgil and Dante's in the infernal regions, sink into comparative insignificance when compared with the wanderings of the British Dental Association through this weird region of booming machines, steaming cauldrons, colossal mash tubs and frothing seas of darksome liquid.

"Forward went the little companies, soon falling apart, by

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foaming torrents of sweet-wort dashing side by side with cooling streams, on either side endless plains of germinating grain. High above head advance parties could be seen threading their way across narrow bridges and looking small at the dizzy height, like roped gangs of mountaineers when viewed through telescopes from some Alpine valley. Onward still, now peering through the Stygian darkness of unfathomable reservoirs filled with the fermenting liquor, whose heavy froth could dimly be seen rising and falling in sullen gloom as it emitted its deadly gaseous poison. On again, now letting the eyes wander at leisure over veritable oceans of tranquil stout, calmly awaiting the right moment for 'cooling down.'

"On entering the cooling chamber life assumed a new aspect, for the roar of the machines, the heavy, sickening atmosphere, the volumes of steam, the cartloads of yeast, the mountains of hops, were things of the past, and the dazed eyes of the Association lingered for a few minutes with pleasure on the snow white walls and fretwork of pipes covered with a glistening mantle of hoar frost.

"One peep into the storage chamber was all that was allowed. The last individual who attempted to explore it, although armed with provisions for three weeks, returned in an emaciated condition with his self-imposed task unaccomplished.

"Looking at these endless rows of gigantic vats, as big as houses, one could only think what a thirsty world this must be, and wonder if Messrs. Guinness, Sons & Co., on the principle of a celebrated Macedonian monarch, ever wept because there were no more worlds to supply.

"At this point the Association reassembled, and a dainty little railway train awaited. All being seated, the diminutive engine started off at a merry pace, but soon, however, entered a darksome tunnel which led by a spiral descent to a part of the establishment, on the level of the Liffey, where a new world opened up. Here the barrelling process held sway. Barrels in thousands were everywhere. Barrels were being made, mended and filled, the stout being conducted in pipes from the storage vats. Little railways, both broad and narrow gauge, intersected in all directions. It was amusing to see the way in which the narrow gauge engines were made serviceable on the broader gauge when necessary. These little creatures were lifted bodily into the air by a sort of crane, where they snorted with evident delight at the

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prospect of their promotion, and were then let down into trucks on the broad gauge line, whose wheels by an ingenious arrangement they were able to keep in motion.

"But one thing remained, and that was to taste the result of all this outcome of human ingenuity, skill and enterprise. The Association tasted and pronounced the result excellent.

"It has been stated that the Association started at the outset in companies of twenty. Some battled on bravely to the end (that end which was not 'bitter' but 'stout'), others fell off by the way, but our kind friend Dr. Baker picked up all the fragments that remained, and saw everyone safely off in good time for the Howth excursion."

At 12.40 p.m., a still larger party started by special train for Howth, that beautiful but much neglected watering place. Arriving at Howth the company broke up into two sections, one of which proceeded in carriages through the town and along the hill road to the Pavilion, while the other walked through the demesne to the same place. These latter enjoyed the advantage of having the earl's nephew himself for cicerone, and were soon well posted in the strange legends and wonders with which the old castle abounds. Here luncheon was served, and Mr. J. R. WIGHAM, J.P., delivered a brief address on the uses of gas as an illuminant for lighthouses, illustrating his remarks by neat models.

Mr. CHARTERS WHITE proposed, and Mr. PENFOLD seconded a vote of thanks to Mr. Wigham for his address.

The motion was adopted with acclamation.

Mr. BOWMAN M'LEOD (Edinburgh) moved a vote of thanks to the president and the hon. sec. of the Representative Committee of the Association for the admirable manner in which they had carried out all the arrangements for their comfort, and trusted that ere long the Association would have another opportunity of visiting Ireland.

The motion was unanimously adopted.

Mr. W. BOOTH-PEARSALL, on behalf of the committee, returned thanks. He said they had done what they could in Dublin to make this meeting a success, and from the warm manner in which the vote had been adopted, he was sure their efforts had been appreciated.

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EXCURSION TO HOWTH BAILEY LIGHTHOUSE.

At the request of the committee, Mr. J. R. WIGHAM gave a short description of gas illumination in lighthouses at the Bailey Lighthouse. He explained the systems of illuminating lighthouses by gas adopted by the Commissioners of Irish Lights, which originated in the year 1865, when his invention was applied at Howth Bailey Lighthouse. Up to that time the oil lamp used in connection with the dioptric apparatus, devised by Fresnel in the beginning of the century, was the only lighthouse illuminant. Gas has been in use at Howth Bailey now for twenty-three years. It has never failed, but has always given great satisfaction to mariners.

Mr. WIGHAM explained in detail the construction and principle of the burner which is used under his gas system in lighthouses. The light for ordinary clear weather proceeds from twenty-eight jets of gas, burned so as to give an intense white light. No chimney glass is used, so that nothing is interposed between the light of the burner and the lens by which it is transmitted to the observer. The power of the light can be increased according to the state of the atmosphere by adding rings of jets, making the flame proceed from 48, 68, 88, and 108 jets respectively. The change from the lowest to the highest power, or *vice versa*, can be made in two or three minutes.

Howth Bailey is termed a fixed light—that is, the dioptric apparatus is that which is used for lights showing continuously to every part of the horizon. Lights of this character are much less powerful than revolving lights. The gas system is equally applicable to fixed and revolving lights. In the revolving light the dioptric apparatus is different, annular lenses being used instead of refracting belts, and the powerful resultant beam of light being transmitted to the observer at stated intervals. The gas system is especially applicable to what are called intermittent and group flashing lights, the intermission of the flame being caused by cutting off the supply of gas during the periods of darkness, and thus securing considerable economy not available in oil lights.

The usefulness of gas for lighthouse purposes, especially in foggy weather, became so apparent that the Commissioners of Irish Lights, acting under the advice of Professor Tyndall, their scientific adviser, applied it to the following lighthouses, viz. :—

Howth Bailey ..... Fixed Light.
Wicklow Head ..... Intermittent.

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Hook Tower ..... Fixed.
Mine Head ..... Intermittent.
Rockabill..... Revolving.
St. John's Point ..... Intermittent.
Galley Head ..... Quadriform group flashing.
Mew Island..... Triform group flashing, and
Tory Island..... Triform group flashing with long focus lenses.

The lights from the last three lighthouses are the largest in the world, being produced by an arrangement of superposed burners and lenses, the invention of Mr. Wigham, which he described in detail, and illustrated by means of models.

This great advance in lighthouse illumination not having originated with the Trinity House, did not receive from that body the favour its merits deserved, but at the request of the Board of Trade they applied the gas system at Haistro Lighthouse, on the coast of Norfolk, where, as in the case of the Irish lighthouses, it has been a continuous success. Professor Tyndall was appointed to make experiments there, and reported in favour of gas as against oil. The engineer to the Trinity House, who also took part in the experiments, wrote a supplementary statement minimising the advantages of gas, which, however, he did not venture to deny. The Trinity House, therefore, stated that they preferred to use oil for their own lighthouses, but recommended the development of the gas system in Ireland. Notwithstanding this recommendation, the Trinity House, acting presumably under the influence of their engineer, opposed this development, and to such an extent that it was with the greatest difficulty the Irish Lights' Commissioners obtained sanction for the establishment of the great gas lights which they have fixed at Mew and Tory Islands.

Under these circumstances the President of the Board of Trade in 1883 ordered that a fresh set of experiments should be made, and appointed a committee, of which Professor Tyndall was a member, to carry them out and report upon the general subject of the best illuminate for lighthouses. This committee sat for a short time, but because the Trinity House and those connected with them who formed the majority of the committee came to the astounding resolution not to permit Mr. Wigham to show in the experiment a new form of light which he had devised, called the double quadriform light, the Irish Lights' Commissioners withdrew their representatives from the committee, and it was consequently

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dissolved Professor Tyndall had previously withdrawn because he thought that the Trinity House should not have predominance upon the committee.

The Board of Trade then committed the whole inquiry into the hands of the Trinity House, apparently forgetting the opposition of that corporation and their engineer to the gas system, and the marked example of it shown by the refusal of their representatives upon the illuminants' committee to admit the double quadriform light to competition in the trials. Trinity House in their experiments at South Foreland persisted in this refusal, and it is difficult to imagine any sound excuse for such an infatuated unreasonable course, so evidently detrimental to the public interest and subversive of the very object for which the inquiry was instituted.

The report of the Trinity House respecting the trials which were made at South Foreland was duly published and caused much dissatisfaction. Mr. Wigham pointed out to the Board of Trade, as well as in communications to the *Times* and otherwise, his objections to the experiments, and the report based upon them, not only because of the exclusion of the best form of gaslight, but for other reasons. Shipowners of the Mersey, the Clyde, the Tyne, the Severn, and of Belfast, Dublin and Cork, as well as the harbour authorities of various important seaports, repeatedly memorialised the Board of Trade to have the report remitted for revision to competent scientific authority not connected with the Trinity House. These memorials, and the correspondence connected with them, have been published as Parliamentary papers, and the matter is not likely to be allowed to rest in its present position.

After the refusal of the Trinity House to show the double quadriform light, it was erected with the consent of the Commissioners of Irish Lights at their experiment house here, and met with the warm approval of those who saw it. Sir Howard Grubb, F.R.S., made a report respecting it, the main substance of which is that, as its name implies, it transmits to the observer double the light of the most powerful lighthouse light in existence. Professor Barrett has also given testimony as to its extraordinary power in fog. Is it just or fair that in the hour of his greatest danger the light transmitted to the mariner should be only half of that which it is possible under this new system to give him?

Notwithstanding its enormous power, the double quadriform light is not costly, because for ordinary weather a single burner is sufficient, and although the consumption of gas in foggy weather is

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considerable, the average duration of fog during the year is only about 431 out of 4,380 hours of darkness in the year, and therefore the annual cost of the light does not much exceed that of an ordinary lighthouse. But even if it were otherwise Mr. WIGHAM submitted that surely no question of expense should be allowed to interfere with the safety to life and property which would result from the adoption of this light.

Mr. Wigham mentioned that the highest power of the oil light used in lighthouses prior to his invention was 328 candles, but that under the stimulus of competition with gas, the oil light has been improved, and its highest power now used at Tuskar is 1,894 candles. The highest power of the gas, as at Mew Island and Tory, is 8,802, while the power of the double quadriform gas lights shown at Howth, as above referred to, is 23,472 candles. Mr. Wigham also pointed out a great collateral advantage of the use of gas for lighthouses in the important fact that where gas is used powerful fog signals can be instantly applied when the state of the weather requires it, whereas in other cases where steam or hot air is used, much time must elapse before the signal can be sounded, during which vessels may run into danger and be shipwrecked, as indeed was the case in the recent lamentable wreck of the "Victoria" at Dieppe. If gas had been the motive power in that case, no loss of life or property would have occurred.

In conclusion, Mr. Wigham paid a tribute to the Commissioners of Irish Lights for the persistency with which they had contended against the opposition of the Trinity House through the Board of Trade, and carried out in spite of great difficulties the gas system of illuminating lighthouses, which as far as it has gone, has conferred great benefit upon navigation and maritime commerce, and which in the future, under their fostering care, is calculated to accomplish still more beneficial results.

A vote of cordial thanks was proposed to Mr. Wigham for his address, and this being put by Mr. PEARSALL, was carried by acclamation.

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TRANSACTIONS

OF THE

British Dental Association,

AT ITS

Ninth Annual General Meeting,

HELD IN

BRIGHTON,

On THURSDAY, FRIDAY, and SATURDAY,

AUGUST 22nd, 23rd, and 24th, 1889.

REPRINTED FROM THE JOURNAL OF THE ASSOCIATION.

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CONTENTS.

PAGE

Anæsthetic Mixtures, Frederick Hewitt, M.A., M.D.Cantab., on 42

Anæsthetics, George Bailey, M.R.C.S.Eng., on 66

Benevolent Fund, Annual Meeting 86

Business Meeting, The... 5

Chloroform, Bowman Macleod, L.D.S., on 35

Demonstrations, The 143

Discussion on Anæsthetics 66

Implantation, G. Cunningham, M.A.Cantab., L.D.S.Eng., D.M.D. Harv., on 112

Inaugural Address, by S. Lee Rymer, J.P. 19

Iodoform, R. Denison Pedley, F.R.C.S.Edin., M.R.C.S., L.D.S. Eng. 138

Members present, List of 1

Nitrous Oxide Narcosis, Dudley Buxton, M.D., B.S.Lond., L.R.C.P., on 53

Representative Board Meeting, The 3

Sulphuric Ether, F. R. Cruise, M.D.Dub., on 29

Teeth of Tertiary Mammals, John Humphreys, L.D.S., on ... 96

Vulcanite, J. H. Reinhardt, L.D.S.I., on 108

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APR 1 - 1914
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British Dental Association.

REPORT OF PROCEEDINGS

AT THE

ANNUAL GENERAL MEETING,

HELD IN BRIGHTON,

On THURSDAY, FRIDAY and SATURDAY,

August 23rd, 24th and 25th, 1889.

[REPRINTED FROM THE JOURNAL OF THE ASSOCIATION.]

THE Annual General Meeting of the Association was held this year at the Royal Pavilion, Brighton.

On the evening of Wednesday the 21st the festivities commenced with a reception by Mr. Alderman Rymer at the Pavilion, which was followed by an exceptionally interesting chamber concert, and thus the members and their friends were afforded an opportunity of a pleasant social gathering before entering upon the more serious business of the meeting.

Thursday, August 22nd.

On Thursday morning the business of the meeting commenced. Mr. J. SMITH TURNER, President of the Representative Board, occupied the Chair. The following gentlemen signed their names, as having attended, in the book provided for the purpose :—

Ackery, J., London.
Alexander, M., Liverpool.
Amoore, D. W., St. Leonards.
Amoore, J. S., Edinburgh.
Apperly, E., Stroud.

Bacon, B. W., Tunbridge Wells.
Balcomb, T., Jersey.
Baldwin, H., London.
Barnard, A. G. W., London.
Barton, W., Eastbourne.
Bateman, G. W., London.
Bayfield, C. M., London.
Bell, Frank, Tunbridge Wells.
Birch, J. Charters, Leeds.
Browne-Mason, C., Scarboro'.

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Browne-Mason, J. T., Exeter.
Brunton, Geo., Leeds.

Cameron, D. R., Glasgow.
Cameron, James, Glasgow.
Canton, F., London.
Caush, D. E., Brighton.
Clarke, T. Meadows, Richmond, Surrey.
Cocker, Arthur, Halifax.
Coffin, H. L., London.
Coffin, W. H., London.
Cole, J. Fenn, Ipswich.
Colyer, H. O., Ryde, I. of Wight.
Corbett, D., jun., Dublin.
Cornelius-Wheeler, J., Southsea.
Coxon, S. A., Wisbech.
Cumine, R. H., London.
Cunningham, Geo., Cambridge.
Curnock, G. D., London.
Cuscaden, R. D., Sligo.

Daish, W. G., Ryde, I. of Wight.
Dennant, J., Brighton.
Dent, J. W., Stockton-on-Tees.
Dickinson, M.de C., St. Leonards.
Donagan, A. E., Birmingham.

Egan, L. J., Cork.
Elliott, T. H., Brighton.
Elliott, W. T., Birmingham.
Elwood, W. H., Belfast.
Evans, Henry, Tenby.

Fagge, L. M., London.
Faulkner, John, London.
Feltham, R. E., Brighton.
Fernald, H. P., Cheltenham.
Fisher, W. M., Dundee.
Foran, J. C., Eastbourne.
Fothergill, A., Darlington.
Fox, O. A., Brighton.

Gabell, A., Redhill.
Gartrell, J. H., Penzance.
Gaskell, W. F., Liverpool.
Geekie, W., Oxford.
Gill, H. B., Norwood.
Grayston, W. C., Scarborough.
Griffiths, H. W., Newport.
Grove, H. N., Walsall.

Hall, Frank, Hertford.
Hall, T. S. Muspratt, Rock Ferry.
Hare, S. W., Chichester.
Harris, H. E., London.
Harrison, A. B., Newcastle-on-Tyne.
Harrison, Walter, Brighton.
Hatch, R. M., Bristol.
Hayman, C. A., Bristol.
Helyar, Wm., Bristol.
Henry, George, Hastings.
Hepburn, D. S., Nottingham.
Hern, W., London.
Hinds, Jas., Coventry.
Hockley, A. G., London.
Hughes, Morgan, Croydon.
Humphreys, John, Birmingham.
Husbands, J. E., Gt. Grimsby.
Hutchinson, S. J., London.

Jackson, Thos., Burnley.
Johnson, M., Chester.
Johnson, S. P., West Brighton.
Jones, Alfred, Cambridge.

Kerr, E. S., West Brighton.
Kirby, Alex., Bedford.
Kluht, H. J., London.

Ladmore, E. J., Bradford.
Laurence, H. A., Ealing.
Lennox, R. P., Cambridge.
Lewes, E. A., London.
Lodge, G. H., Rotherham.
Lucas, G. J., London.

Mackenzie, F. V., London.
Macleod, W. B., Edinburgh.
Maden, W. H., Rawtenstall.
Maitland, Louis, London.
Mallet, G., Newbury.
Mallet, H., Exeter.
Mansell, T., Birkenhead.
Manton, John N., Wakefield.
Mapplebeck, W., Liverpool.
Martin, Henry, Portsmouth.
Matheson, L., London.
Maxwell, L., Hastings.
McAdam, Geo. C., Hereford.
McCash, J. M., Glasgow.
McStay, John, Belfast.
Moore, R. H., Dublin.

Newland-Pedley, F., London.
Norris, E. L., Brighton.

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Owen, R., Wolverhampton.

Palethorpe, W., Birmingham.
Parkinson, G. W., London.
Peall, F. S., London.
Pearse, John, Tunbridge Wells
Pedley, G., London.
Pedley, R. D., London.
Penfold, W., London.
Pike, J. L. F., Sheffield.
Pillin, L. B., London.

Quinby, H. C., Liverpool.
Quinlan, T., Cardiff.

Redman, J. H., Brighton.
Reinhardt, J. H., London.
Rhodes, W. A., Cambridge.
Richards, F. W., Birmingham.
Richards, G. O., Richmond, Surrey.
Rilot, C. F., London.
Robbins, C., London.
Rock, F. J., Brighton.
Rowney, T. W. F., Derby.
Rymer, James F., Maidstone.
Rymer, S. Lee, Croydon.

Sanders, J. J. H., Barnstaple.
Saunders, W., Ramsgate.
Sherwood, M., Oxford.
Silvester, S. T., Croydon.
Sims, Chas., Birmingham.
Smale, Morton, London.
Smith, A., Bristol.
Spokes, P. S., London.
Spotswood, John, Sheffield.
Stack, R. T., Dublin.
Stoner, C. B., Brighton.
Stoner, J. N., Brighton.
Storey, J. C., Hull.
Street, G. H., Richmond, Surrey.
Surman, R. J., Worcester.

Tait, T. A., Tenterden.
Tester, A. H., Tunbridge Wells.
Tod, E. M., Brighton.
Tomes, Sir John, Caterham.
Trollope, W. T., Tunbridge Wells.
Turner, J. Smith, London.

Underwood, A. S., London.

Vander Pant, F. J., Kingston-on-Thames.

Waite, W. H., Liverpool.
Walker, F. D., Doncaster.
Wallis, C. J. B., London.
Wallis, J. G., Hull.
Watson, D., London.
Weiss, Felix, London.
Weiss, F. Henri, London.
Weiss, Willoughby, London.
Welch James E., Brighton.
Welham, G. W., London.
West, Charles, London.
Whatford, J. H., Eastbourne.
Whatford, J. T., Brighton.
White, T. Charters, London.
Whittaker, G. O., Manchester.
Williams, Caleb, Leamington.
Williams, F. W., Bedford.
Williams, G. J., London.
Williams, H., Londonderry.
Williams, Walter, Eastbourne.
Wilson, J. A., Bangor.
Wolfenden, A. B., Halifax.
Wonfor, T. W. C., Brighton.
Wood, John, Brighton.
Wood, R. E., Eastbourne.
Wood, W. R., jun., Brighton.
Wormald, D. A., Bury.
Wormald, S., Stockport.
Wormald, T., Oldham.
Wright, J., Midhurst.
Wyles, Henry, Leeds.

Meeting of the Representative Board.

A MEETING of the Representative Board was held on Thursday, August 22nd, at Brighton, Mr. J. SMITH TURNER in the chair. The following gentlemen were present:—Messrs. Weiss, Coffin, Matheson, C. West, Ackery, Canton, and Smale (London);

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Messrs. Redman (Brighton), Bacon (Tunbridge Wells), Lee Pike (Sheffield), W. C. Quinby (Liverpool), McLeod (Edinburgh), Waite (Liverpool), Morgan Hughes (Croydon), Cunningham and Rhodes (Cambridge), Fenn Cole (Ipswich). Excuses for absence were announced from Messrs. Corbett, Pearsall, Stack, Rees Price and Oliver.

It was recommended that the Annual Meeting of 1890 should be held at Exeter on August 23rd, 24th, and 25th, and Mr. Browne-Mason was nominated as President-elect.

The Hon. Treasurer's and Secretary's reports were taken as read.

The following members retired in rotation from the Representative Board:—Sir John Tomes, Sir Edwin Saunders, Messrs. G. W. Parkinson, J. H. Mummery, S. J. Hutchinson (for London); Messrs. C. H. Bromley, C. Sims, Blandy, Fenn Cole (for the Provinces).

In conformity with a resolution of the Business Committee, the five retiring members for London were replaced by three, and the remaining vacancies filled by provincial members, viz.: Messrs. D. Hepburn, S. Spokes, W. H. Woodruff (London), and R. P. Lennox, G. Cunningham (re-elected), J. R. Brownlie, C. Sims (re-elected), W. E. Harding, E. L. Dudley, E. Apperley, J. Cornelius-Wheeler, and T. E. King (for the provinces).

In view of the resolution to be moved at the Annual Meeting, "That the Vice-Presidents may be elected by the Association in General Meeting on the recommendation of the Representative Board," it was agreed, in the event of this resolution being carried, to nominate Sir John Tomes, Sir Edwin Saunders and Dr. John Smith for election to that office.

It was resolved to bring the correspondence of Dr. Rentoul before the Annual Meeting.

Some cases of infringement of the Dentists Act were referred for further consideration to the Business Committee.

The following gentlemen were elected Members of the Association: A. E. Donagan, B.A.Cantab., L.D.S. Edin. (Birmingham); R. Feltham (Brighton); J. E. Husbands, L.D.S.Edin. (Grimsby); J. G. Munro, L.D.S.Edin. (Edinburgh); W. H. Madin, L.D.S.I. (Rawtenstall); W. B. Paterson, F.R.C.S., L.D.S.Eng. (London); F. Page, L.D.S.Edin. (Edinburgh); F. J. Rock (Brighton); G. W. Stringfield, L.D.S.Edin. (Lowestoft).

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The Business Meeting.

The CHAIRMAN said he had first to ask the Honorary Secretary to read a letter from their President, Mr. Corbett, of Dublin, regretting his inability to be present. He was sure that he was only expressing the regret of all the members in saying how sorry they were that Mr. Corbett was not able to be present. Mr. Corbett's letter expressing regret at his unavoidable absence was then read. He had now to call upon the Treasurer to read his annual report.

Mr. F. CANTON, the Hon. Treasurer, read the report as follows:—

GENTLEMEN,—In presenting my report I shall as usual not detain you long, but have added a few particulars which I thought might be of interest to the members.

In 1879 the Association started with only 161 members, and this number has each year increased until we now in 1889 number nearly 800, and I cannot help thinking that if individual members of the Association would only look round them they would find many men willing to join if only asked to do so, and our members might very speedily be raised to at least 1000.

Since the formation of the Association in 1879, now just ten years, ninety-five members have been removed for non-payment of their subscriptions, according to your bye laws, but I am very glad to say that eleven of these have joined us again and I hope that we may yet get many of the others back.

The Association, since its establishment to the end of the year 1888, has proceeded against seventeen persons for infringement of the Dentists Act, and in every case with success. The costs of these prosecutions have amounted to £416 18s.

Our Journal is necessarily an expensive item in our expenditure, although so much gratuitous labour is given by a few members towards carrying it on. At the same time I think all members will agree that it would be exceedingly difficult if not impossible to carry on the Association successfully without it; I only hope the day is not far distant when our funds will allow us to pay fully for work done in this department of our Association.

The average cost of the Journal per month for printing, &c., is about £35, making £420 a year exclusive of our sub-editor's salary and reporting, &c., which brings it to about £550.

Reporting the annual meetings of the branches and the annual meeting of the Association forms a considerable item.

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Our present balance at the bank is £805 11s. 5d.

There are at present 147 members in arrears with their subscriptions, of whom twenty-two are two years in arrears. I need hardly say that I shall be very glad to receive the subscriptions of any member present who is in arrears, and I have order forms for paying through a bank, which I shall be happy to give to anyone who desires to pay in this way.

The accounts of the Association are published annually in the Journal, so that I need not detain you longer.

The CHAIRMAN having put the question from the chair that the report of the Treasurer be accepted, the motion was unanimously agreed to.

Mr. MORTON SMALE, the Honorary Secretary, then read the following report:—

GENTLEMEN,—In laying before you an account of the proceedings of the Association your Executive have to report a reasonable amount of progress both numerically and financially—not, perhaps, all that can be desired in either particular, but, nevertheless, a progress which if it be slow is none the less sure and satisfactory.

During the past year your Representative Board has met four times and your Business Committee eleven times. The matter under their consideration other than that which is strictly administrative has been of the usual character, having reference chiefly to the prosecution of offenders against the Dentists Act and the maintenance of the integrity of the Dentists' Register.

It has been long evident to your Executive that the prosecution of offenders as hitherto conducted, although eminently successful from a legal point of view, has not produced that impression on the public generally which is so very desirable. The difficulty of carrying out a scheme which would be more effectual seems to increase as it is considered more closely, but we hope to surmount some of the obstacles, and if possible by concerted action to impress and enlighten the public in addition to punishing the offenders—a result with which we shall be all much gratified. Two conditions, however, for the due and proper carrying out of such a scheme are necessary, viz., a large increase in the number of our members, with a corresponding addition to the revenues of the Association, and regular payment of their subscriptions by the members.

The prosecutions, all of which have been successfully carried out, during the year have been three in number, viz., Gray, of

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Glasgow, and Abel, of Newport; the former carried out by the West of Scotland Branch; the latter by the lawyers of the Association. The case of Jackson, of Halifax, was conducted by a local lawyer at the instigation of the practitioners in that town, but the whole expenses incurred have been paid by the Association. In the cases of both Jackson and Gray a new question was raised and decided in our favour, that irregular practitioners cannot protect themselves by publishing in small letters between their own names and the title "dentist" the words "late with Mr. So and So." A very important opinion has been obtained from the eminent criminal barrister, Mr. Poland, with regard to irregular practices, which can be seen by any of the members of the Association on applying to the Hon. Secretary.

A member of the Association who was guilty of publishing his private address on a card issued by an advertising Dental Institution has been called to account, and he has at the request of the Association had the address removed.

With regard to the Register, your Executive have been in repeated communication with the President and Registrar of the General Medical Council, who have at all times shown an earnest desire to administer the Dentists Act fairly and impartially, by the large amount of private and leisure time they have been ready to sacrifice to the consideration of our business, and as most of you already know, the President has recently adopted the expedient of demanding the certificate of birth from those who apply for registration under clause 37.

The cases of incorrect address are not numerous and in those which have come under our notice have appeared to be solely caused by the carelessness of those most intimately concerned, and not by any inattention on the part of the Registrar.

According to a resolution of the Representative Board a copy of standing orders is being compiled from the new index to the minutes of the Representative Board. This will in future be attached to each copy of the bye-laws, in order that every member may have a better idea of the real constitution of our Association as it has been built up upon our articles of Association and bye-laws.

At our highly successful meeting in Dublin a resolution was brought before you regarding Vice-Presidents. The office has been in existence before, but owing to the apparent want of harmony between the articles of Association and the bye-laws, it has

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fallen into abeyance. Following the resolution then passed there will be brought before you to-day another resolution for your consideration concerning the mode of appointing Vice-Presidents, and another proposed by Mr. King, of York, that the President and President-elect of the Association shall be members of all Committees.

The enlarged and improved list of members issued this year, it is hoped, has given unusual satisfaction, and been found to be of great practical utility.

The meetings of the Branches during the past year have been numerous and successful, and have provided the Journal with much excellent matter. Great public good is done by the holding of these meetings in various parts of the kingdom frequently. It is also highly desirable that the Executive of the Branches should take steps to give publicity to such meetings in the public press, taking due and proper care that no abuse of such publicity should be permitted for the personal advertisement of one individual.

Sixty-four new members have been elected during the year. Sixteen have been removed for non-payment of subscriptions, five have resigned, while the Association has to regret the loss of two members by death, the actual number of members being 751, as compared with 710 last year.

Our loss by deaths is a serious one, for each of the members are well-known figures at our Annual Meetings—Mr. Jewitt, of Liverpool, and Mr. Spence Bate, F.R.S., of Plymouth. Mr. Bate had held the presidential chair, and his reputation as a scientist had passed far beyond the circle of his profession, and his loss must be regretted not only by this Association, but by the whole scientific world. Mr. Jewitt at all times took a lively interest in the welfare not only of the Association but of his profession, and had been a member of the Council of the Midland Branch. With the relatives of each of these our Association must feel sincere condolence in their bereavement.

In presenting to you this Annual Report, the Executive have to congratulate the members on the Association having completed the first decade of its existence, and to express the hope that its progress and consolidation may continue in a like gradual and satisfactory manner. It is in the nature of things that changes must come, but if they are to be constructive, they must be made with careful consideration of the future of the Association and also of the profession which the Association represents. While laws

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have to be made, errors will occur in the making thereof, and while laws have to be administered, errors will occur in the administration thereof; but the remedy is not always to be found either in new laws or new administrators, for we cannot escape the condition of human fallibility.

The CHAIRMAN said that as the Secretary's Report was of a more formal character than that of their Treasurer he would ask someone to propose its adoption.

Mr. PILLIN moved that the report might be adopted.

Mr. FENN COLE seconded the resolution, which was unanimously agreed to.

The CHAIRMAN said the next business was the fixing of time and place of the Annual Meeting for 1890. The Representative Board had received an invitation from the Western Counties Branch expressing a desire that the meeting should be held in Exeter, also that Mr. Browne-Mason should be the President-elect. He asked the members if they were willing to accept the invitation of the Western Counties Branch; and in putting that question he was quite sure that the gentlemen constituting that Branch would do all they could to receive the Association in a becoming manner.

The resolution to accept the invitation of the Western Counties Branch was carried by acclamation.

The CHAIRMAN said it would follow as a sequence that Mr. Browne-Mason would be chosen as President-elect.

The resolution was agreed to.

Mr. BROWNE-MASON, in responding, said he felt very highly the honour that had been conferred upon him by nominating him as President-elect. He was afraid that he might not be a very worthy successor of the very eminent men who had preceded him, but they might be assured that he would do his utmost to render the meeting a success. The old city of Exeter had many claims upon a Society such as this, first, on account of its easy access to all parts of the United Kingdom. They were only four and a-quarter hours' journey from London; they had improved their communication with the North by the Severn Tunnel, which really made the journey from Scotland a very small affair. The old city was a very attractive place. There were many archæological points of interest about it that must be attractive. It was in the midst of charming scenery, and altogether there could be no more enjoyable place for members who could give the time

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than to run round their sea-board both north and south, and to get upon Dartmoor, which was to his mind the acme of a pleasure ground. He was sure that the Western Branch would accord the Association the warmest of receptions, and he should be only too willing to do anything that lay in his power to make their meeting a successful one.

The CHAIRMAN suggested that the date of their next meeting should be the 23rd, 24th and 25th August, 1890, and these dates were accepted by the meeting.

The Chairman said the next business was the appointment of members for the Representative Board. By their rules five members from the provinces had to retire, and five from London, and the usual custom had been to substitute them by representatives chosen in equal proportions from both places. According to a resolution that had been passed by the Representative Board, the changes were not to be quite as invariable as they had been hitherto. It had been considered by the Board that owing to the large increase of members in the provinces, there ought to be a greater number of representatives coming from the provinces than there were at present. He would ask the Secretary to read the resolution.

Mr. MORTON SMALE said the resolution carried at the last meeting of the Business Committee was, "That in view of the increase of country members which has taken place of late, it has been deemed advisable that the number of provincial members on the Representative Board should be increased." This year it had been decided only to recommend three names for London: Mr. Sidney Spokes, Mr. David Hepburn, and Mr. W. H. Woodruff. For the provinces the following gentlemen were nominated: Mr. J. R. Brownlie, of Glasgow; Mr. C. Simms, of Birmingham; Mr. W. E. Harding, of Shrewsbury; Mr. B. Dudley, of Bath; Mr. Apperly, of Stroud; Mr. J. Cornelius-Wheeler, of Southsea; Mr. T. E. King, of York; Mr. G. Cunningham, of Cambridge; and Mr. Lennox, of Cambridge. Those were the names suggested by the Representative Board for their consideration, but if any member had any other name to propose, they would be very happy to consider it.

The CHAIRMAN said most of the gentlemen nominated from the provinces had been nominated by the branches themselves. If there was no other name proposed he would ask the members to proceed to their election.

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The above gentlemen were duly elected to fill up the vacancies on the Representative Board.

The CHAIRMAN said the names of the London members who had been removed from the Representative Board were Mr. Parkinson, Mr. Mummery, Sir John Tomes, Sir Edwin Saunders, and Mr. S. J. Hutchinson. Those from the provinces were Mr. Bromley, Mr. Simms, Mr. Blandy, Mr. G. Cunningham, and Mr. Fenn Cole. He was sure the members must regret their loss, although in the ordinary course of events they had to make room for others; at any rate they would be entirely forgetting their duty if they did not accord to them their sincere and hearty thanks for the services they had rendered the Association as members of the Board.

The motion was carried with acclamation.

A motion of which Mr. KING, of York, had given notice was postponed, owing to his absence.

Mr. F. CANTON said at the last meeting it was decided to alter their bye-laws and make them similar to their Articles of Association, so that they might elect Vice-presidents, and Bye-law 7 was altered accordingly. It was now for the meeting to decide how these Vice-presidents should be elected. On reference to the Articles of Association, page ix., No. 8, it was there stated that Fellows might be elected from time to time by the Association in general meeting on the recommendation of the Board. He had taken this as his guide in bringing forward the following resolution:—"That the Vice-presidents may be elected by the Association in general meeting on the recommendation of the Representative Board." The object of having Vice-presidents was that they might be enabled to keep amongst them in honourable position those who had done good work in the cause of the Association, and who, from increasing years or failing health, did not feel equal to taking an active part, although the Association would be exceedingly sorry to lose their services and influence altogether. He moved the resolution with the consent and approval of the Representative Board.

Mr. MORTON SMALE said he had very great pleasure in seconding the resolution.

Mr. BROWNE-MASON thought it was a resolution to which no exception could be taken. It was most desirable that they should keep their old friends amongst them as long as they would stay with them. He did not think the resolution was one which required any comment.

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The CHAIRMAN said if there was no amendment moved he would put the resolution to the meeting.

The resolution was unanimously agreed to.

The CHAIRMAN said there would be a matter brought before the Association shortly which he would only briefly allude to now. It was a sad event, and it had prompted them to take action on the resolution that had just been passed. If that resolution had been passed in the previous year they would have had amongst the names of their Vice-presidents one who had since passed away from them, and whom they all respected and esteemed. He referred to the late Mr. Spence Bate, of Plymouth. The Representative Board had thought it wise to ask the Association to act upon this resolution at once, and suggested that they should immediately elect as Vice-presidents of the Association Sir John Tomes, Sir Edwin Saunders, and Dr. John Smith, of Edinburgh. It would be presumption on his part to pretend to recommend these names in any way whatever. He would only say that those gentlemen had been with them in the very front of their movement since its origin, and indeed to some of them they were indebted for its origin. He hoped, therefore, that without further delay in any way they would signify their approval of this suggestion of the Representative Board, and elect these three gentlemen by acclamation.

The resolution was carried by acclamation.

Sir JOHN TOMES said he was the only one of the three who was present at the meeting, otherwise he might have retired from the post of returning special thanks as not being the oldest. Seeing, however, that Sir Edwin Saunders and Dr. Smith were not present, in their name and on his own part he thanked the Association heartily for the honour which had been done them by electing them as the first batch of Vice-presidents. Speaking for himself he feared that he could not be looked upon except as a book placed upon a shelf to be taken down occasionally for reference, so long as the binding held the leaves together. However, whatever the worth, he thought he might venture to speak not only for himself but also for his friends, whose services would always be at the command of the profession and especially of this Association, which had, by their election, established a grade of permanent officers. In making that comment he was rather disposed to add a rider to it, and to say that in creating permanent officers there was a certain degree of danger.

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They might elect persons who would always attend, and who would always want to talk, and, therefore, there should at all times in making such an election be a certain amount of discretion exercised, because an Association of that kind which had endeavoured from the first to be a truly representative one, if they had a vast number of permanent officers would cease to have that character. They wanted from time to time to have the introduction of new blood so that the Representative Board should really represent not the past men but the present men, and keep in full view the current feeling of the day, not the current feeling of yesterday. He thanked the Association for the position which had been given to himself and his fellow Vice-presidents. He had now to call their attention to another matter. He was asked to propose that the Association should send a vote of condolence to Mrs. Spence Bate, who, as they all knew, had lost in her husband a man of great worth as a scientific man, of great worth as a professional man, and of great worth as a personal friend. He had known Mr. Spence Bate for something like half a century, and had found him always a true friend and a wise counsellor. Though apt to propose things that others could not always agree with, still, if he made such proposals he was the first to yield to what seemed to him fair argument. Such a man was of very great value. A man who made ready proposals led to a ready and off-hand discussion, and that proved of very great value in keeping them on the right line. Mr. Spence Bate would sometimes suddenly try to pull them on to a siding, but when it was shown that that siding led to nowhere he was the first to assent and get on to the main line again and give his hearty support to a resolution which possibly at the first he might not have conceived to be of value. He did not think they could exaggerate their appreciation of such a member, nor could they testify too strongly the grief they felt at his loss, not premature, for he was seventy, but still there were many men of seventy amongst them, and some of the oldest and best friends he had ever had had lived to reach the age of ninety, so that Mr. Spence Bate's life might be said in some sort to have been cut short. Most people would, however, be very willing to take seventy as an average if they could secure to themselves as useful a life as Mr. Spence Bate had enjoyed. He hoped the Association would agree to the resolution which had been placed in his hands.

The CHAIRMAN said, as President of the Representative Board

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and as occupying the place, for the time being, of President of the Association, he most regretfully seconded the resolution. Those who had worked with the Association from its commencement best knew the value of the man they had lost. Apart from any social or scientific work which belonged to him, as a member of the Association at its very earliest date, as a promoter of the dental reform movement before the Association was in existence, they remembered Mr. Spence Bate, and they felt his loss. The resolution was that the Secretary be requested to convey to Mrs. Spence Bate the sincere sympathies of the Association in her irreparable loss.

The resolution was unanimously adopted.

The CHAIRMAN said the Association had had under its consideration, for some time past, the fact that the public and also the Government were very badly informed in the matter of the treatment of teeth of young people, and of soldiers and sailors. Several of their members had been at work on this question. A short time ago they memorialised the Admiralty on certain matters, but had not succeeded so far in eliciting a satisfactory reply. He hoped, however, that the matter might still be within their power to take up again. On the present occasion they had to receive a report from the small Committee that was appointed last year. At the meeting last year, a sum of £10 was voted by the Association to Mr. Fisher, of Dundee, which he was to spend in elaborating certain books which would be useful to the Secretaries of Branches, for obtaining statistics from charity and workhouse schools, the object being ultimately to guide the Association in bringing pressure to bear upon those bodies to have the teeth of children looked after by qualified dentists. He would ask Mr. Fisher to make a statement as to what he had been doing.

Mr. W. FISHER (of Dundee) then read the following report:

I have to express my thanks for the vote of £10 granted me at the last Annual Meeting to meet the necessary expenses in publishing a British Dental Association case book for the tabulation of dental disease in children's teeth.

I have been able to provide 100 books, which consist of two pages for reports, and 112 pages with diagrams of the temporary and permanent teeth, each book being capable of receiving the data of fully 1,000 cases.

(Mr. Fisher here passed around the case books, and illustrated a folio on the black board.)

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I would now beg leave to move the following resolutions:

I.—That these case books be sent to the different Branches with the request that the Branch will tabulate the condition of the children's teeth in their district, which are embraced in those schools which have medical officers, and who have not yet dental officers on their staff.

II.—That in the event of any member of our Association knowing of any of the aforesaid schools—not embraced in the district of any Branch—and remaining unexamined, he will apply to the Secretary for a case book, and endeavour to have the school examined and reported on.

III.—That the books be returned filled up, prior to our next Annual Meeting, with the name of the secretary of each school included in the report.

Mr. Browne-Mason referred to some data that Dr. Christopher Harding, fleet surgeon, had given him with reference to the teeth of the blue jackets of the Royal Navy. He met Dr. Harding last year in Dublin, and had travelled with him into the West when the meeting was over, and learned that he was very much interested in hearing what had been discussed at the meeting. Dr. Harding had endeavoured, as fleet surgeon, to wake up the Admiralty on this point, and he subsequently sent him some very copious notes which he had taken whilst on board one of Her Majesty's ships, as the result of inspecting over 1,000 men. The report was a most valuable one.

The Chairman said the Committee had not thought proper to take any steps during the last year in the matter. The reception with which their representations had been met, had not encouraged them to take any immediate action. They rather relied upon the matter being brought before the Association again, and upon its being taken up by the public press.

Mr. G. Cunningham (Cambridge) said he thought they ought to ascertain clearly whether this work was to be carried out or whether it was to be let alone. They as an Association requested the Admiralty to afford facilities for the examination of the sailors' teeth, and their request had been met in the way described; but now they found that the work had already been done by a fleet surgeon. The very information they had asked for was now in their hands, and they ought to make some use of it. If it was not the desire of the Association that this matter should be continued, then they knew what to do independently; but if they had a committee he maintained it ought to do some-

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thing, and they should not allow themselves to be discouraged, more especially when they found that a Medical Officer of Health had taken some action. There was one remark made in that report to which he wished, if possible, to call the attention of the public. They wanted public support, and he believed that if they were convinced that they had the support of the public the Committee would not hesitate. It was simply because they were not certain on that point that they held their hands. The fleet surgeon referred to made this statement, that whilst serving on board one of Her Majesty's ships he was one day horrified by the sick berth steward producing two bottles—Lazenby pickle bottles—one of which was full and the other two-thirds full of teeth which the man said he had extracted in ten months, without the knowledge of the medical officers of the ship, and he was not a little proud of the achievement. He appealed to the Association whether they should allow such things to go on. He repeated that they desired the help of the public and of the press to take up this question, and if they could obtain that he thought that they could induce the Admiralty to take a proper view of this subject.

Mr. L. MATHESON (London) said that he thought Mr. Fisher had taken a very considerable step in the right direction, and he had much pleasure in seconding the resolution which that gentleman had proposed.

The CHAIRMAN said he was much obliged to Mr. Cunningham for reiterating that the committee thought it desirable if possible to create a public opinion on the question. He believed that the press would be induced more fully to interest themselves in the subject if it were brought before them in the shape that Mr. Fisher proposed. They were much obliged to Mr. Fisher for the trouble he had taken, and the only objection he could see to his resolutions was that they were rather too binding. They gave too many directions. It must lie greatly with the secretaries of branches and with the councils of branches, to find out the best way of using these books, but if they could obtain such suggestions as the books would afford, they might be able to make a very strong case to put before the public with reference to the schools. If they could get as far as that they might perhaps then include the training ships and also the full service ships, and eventually the army. A question of this kind, however, was not to be carried by assault, but by patient, persevering, and judicious

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work. Perhaps it might be considered advisable to refer the string of resolutions to the Representative Board. He thought himself that they were too specific, and would embarrass men who might be able to use the books to greater advantage if they were not tied down by such restrictions. He merely threw out the suggestion, and would then leave the matter in the hands of the Association.

Mr. STOREY said he thought it would perhaps be better to carry this resolution first, and then afterwards to move that the matter be referred to the Representative Board in order that they might obtain uniform action throughout the different branches. He suggested that the resolution should be adopted, and that then it should be referred to the Board for further consideration.

Mr. FISHER said that he thought a book should go to the secretary of every branch, and that each branch should work the district. The presidents would ask for volunteers: they would ask young men who joined the branches to take up this work. He thought the matter would be very simple if they were all unanimous. The books should be sent to each branch, the president and secretary should work it, and then return it to the Association.

The resolution was adopted.

Mr. STOREY moved:—"That the question be referred to the Representative Board to formulate a plan for the working of the registers in different branches."

Mr. BROWNE-MASON seconded the resolution, which was agreed to.

The CHAIRMAN said there was a question which was gone into at some length in the last issue of the Journal, and to which their attention was especially called. It was with reference to some propositions made by Dr. Rentoul, of Liverpool, referring to the formation of medical clubs, by means of which people with small incomes could receive medical advice upon the payment of small sums of money. The whole system was laid before the profession in the Journal. The dentists were included amongst the medical attendants, and it was thought advisable, at Dr. Rentoul's request, that the matter should be placed before the members previous to their annual meeting. Certain resolutions proposed by Dr. Rentoul towards carrying out his system were laid before the British Medical Association, which met in Leeds last week, and according to the report were carried unanimously.

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The question was a wide one. Dr. Rentoul had formulated a system of fees for medical men, and he had also formulated a system of fees for dentists. He need hardly say, without entering into the question of the fees suggested for medical men, that the fees suggested for dentists were not quite the kind of fees or the system of payment that dentists themselves would suggest. They were not made with that familiarity with dental work which was necessary for formulating such a scale of charges under such circumstances. Dr. Rentoul was very anxious that attention should be called to the matter at that meeting, that probably some resolution to take his suggestion into consideration might be passed and by that means help him to pursue this course of reform with reference to the medical treatment of poor people, upon which he had entered, and which he had been carrying on for the last six or seven years. He would ask the Secretary to read some correspondence that had taken place with Dr. Rentoul, and also the resolutions which he suggested.

The letters and resolutions were then read.

The CHAIRMAN said it would be seen from the correspondence read, that although this question had been referred to the Dental Association by the author, it was at present hardly in a condition for full discussion, but perhaps it had better be referred to the Representative Board.

Mr. G. CUNNINGHAM said it was manifestly impossible to discuss the matter at that meeting. He would move, "That the Representative Board be requested to examine the proposals made by Mr. R. Rentoul, and to take such action as they deem best in the best interests of the public."

Mr. SPOKES said he had followed very closely the report of the discussion at the British Medical Association, and he found that the matter had been referred to the Council.

Mr. J. DENNANT said he thought the word "profession" should be included in the resolution. He would move that as an amendment.

Mr. MANTON seconded the amendment, which was carried.

The CHAIRMAN then put the resolution as amended, "That the Representative Board be requested to examine the proposals made by Mr. R. Rentoul, and to take such action as they deem best in the best interests of the profession and of the public."

The resolution was agreed to.

The CHAIRMAN said he had now to intimate that in the ordinary

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course of events Mr. Daniel Corbett would have vacated the chair, and would have probably received from the Association the vote of thanks to which he was entitled during his absence. Before leaving the chair, as his representative, he would ask some gentleman to propose a vote of thanks to Mr. Corbett for his services as President during the last year.

Mr. F. CANTON said he should have very much pleasure in proposing a hearty vote of thanks to Mr. Corbett for having acted as their President. He was sure that they could all understand his not being present that day, as he was not very-young, and would have had some distance to travel.

Mr. COFFIN seconded the resolution, which was carried by acclamation.

The CHAIRMAN said he had a list of gentlemen to whom they were greatly indebted for their being able to meet in that place, and for the privileges that had been accorded to them. The first was the Mayor and Corporation of Brighton. Mr. Redman could say more about their generosity to the Association than he was able to do. They had also to give a vote of thanks to the Reception Committee, to the Exhibition Committee, and to the Microscopic Committee. He had also to propose a vote of thanks for mercies not yet received, that was to say, to the demonstrators and the readers of papers; also to the exhibitors and the custodian of the Pavilion.

The resolution was agreed to.

The minutes of the meeting were then read and confirmed.

Mr. J. Smith Turner then vacated the chair, which was taken amid applause, by the President-elect, S. LEE RYMER, Esq., who proceeded to deliver the following inaugural address.

GENTLEMEN,—Amongst the several marks of favour and honour which I have experienced from time to time at the hands of my esteemed professional brethren during the long period extending over thirty-three years, none have been more appreciated by me than this last token of your confidence in electing me to the proud position of President of the British Dental Association for the ensuing year, and I desire, naturally, in the first place, to thank you in all sincerity for the great distinction thus conferred upon me.

In accepting the chair, I need scarcely remind you that I do so under the shadow of domestic sorrow, to which I allude only in order to embrace the opportunity of gratefully acknowledging the

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many touching expressions of professional sympathy, both public and private, with myself and family in an irreparable loss. Fortified with such genuine sympathy, and well knowing what would have been the wish of my late honoured wife under the circumstances of the situation, I take it to be my duty to be present here to-day so that, in the name and on behalf of the Southern Counties Branch—now including the six important counties of Sussex, Kent, Surrey, Hants, Berks, and Wilts—I may accord you all a most hearty welcome to this beautiful town of Brighton where we are assembled to celebrate our ninth Annual General Meeting. True it may be that the locality does not furnish such means of outside instruction coupled with entertainment as are afforded by the great centres of manufacture and of Government works, but, nevertheless, I see no reason why we may not look forward to an entirely successful professional as well as social meeting here, and then the efforts of those entrusted with its organisation will be well rewarded.

In entering upon the tenth year of the existence of the Association, and glancing over its past history, the record, as it appears to me, is one of very remarkable success—success indeed far exceeding my most sanguine anticipations. I am not unacquainted with the fact that there are, amongst our friends, those who would like to have witnessed something approaching to a scene of transformation from a crude and chaotic condition to one of almost millennial splendour, accomplished with lightning rapidity; but all experience teaches that in great undertakings, such as ours, involving dealings with the position of to-day and for the time being, as also the charge of a mission to carefully scan the political horizon and to regulate the educational requirements of the future, the work can only be carried on safely and wisely step by step, albeit in full confidence of success, so that whatever obstacles have to be encountered—and such we may rest assured will prove neither few nor insignificant—a determined executive, supported by a firm and united constituency, will be enabled to follow up the advantages already secured by an undaunted progressive march.

Impatience, despondency and want of faith are the three chief paralysing agencies in the growth of good works. Perish such influences so far as each one of us is concerned! What we *aim* at is *perfection*, and very properly so, although I suppose few, if any of us, are sanguine enough to hope to attain to that exalted standard. At the same time, the higher we do aim the nearer

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are we likely to approach thereto. In another fifty years what changes will have taken place at the present rate of terrestrial advancement! That future period will, no doubt, reveal something like a new world, and yet we who are now assisting at this Brighton conference are actually and practically engaged in—at least partly—moulding the events and conditions not only of the next half-century, but even of time far in advance of its completion. Herein is considerable responsibility, as also ground for lofty effort—effort to be undertaken in assurance of substantial result even if this result be not at once apparent in its entirety—

> "We must believe, for still we hope
> That in a world of larger scope,
> What here is faithfully begun
> Will be completed, not undone."

The history of the art and science of dental surgery, especially under modern aspects, has been so often and eloquently described on occasions like the present that it is altogether unnecessary for me to occupy your short and valuable time by reiteration. You know the loyal and persistent exertions of able men have thus far culminated in giving us such a fixed legal status that the national recognition of dental surgery, as a profession, is an accomplished fact. It is with the object of developing the power thus accorded that the British Dental Association exists.

Its memorandum and Articles of Association and bye-laws need only to be cursorily perused to prove that in this Association we possess an institution of varied efficiency, thoroughly adapted to its purposes.

Firstly, of course, there is the main object, namely, that of carrying out the spirit and provisions of the Dentists Act of 1878. Following in the wake (besides looking to the duty of caring for brethren in distress) are the several items coming under the very unfettered description of "watching over and furthering the general interests of the profession." The field of action is, in fact, almost without limit. Moreover, I think those who have watched the working of the machinery of action of the Association will agree with me that on the whole that machinery is well adapted to the end in view.

Now I will ask you, if you please, to consider well the force that can be brought to bear, as need arises, upon the Imperial Parliament by this British Dental Association—a body composed, as it is, of influential members, forming part of almost every electoral

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constituency in the Kingdom. I have no intention of dwelling upon the subject, but of this I am certain, that your reflections will show you that here we possess an instrumentality of immense and vital importance. Then consider the effect, in the light of science, of the annual gatherings such as that of to-day, and of the benign social influences engendered on these great and exceptional occasions, besides valuable analagous results attained and yet attainable in the regular working of the several branch meetings. If the Association had no other aims than those I have indicated, it would be entitled to all our support. But consider besides the delicate department of operations included in our programme and known as "weeding out"—a necessary but unsavoury piece of business which has been carried out conscientiously with as much success as could have been expected under the limited powers of action hitherto available. It must be remembered that our profession has not yet emerged from a transition state, and that this particular work is therefore, of necessity, carried on slowly and with liberal consideration. From the exigencies of certain localities as well as of individuals, certain practitioners of respectability have not always thought themselves able to keep strictly within the limits of professional dignity. In many such cases forbearance, coupled with friendly intercourse and advice, have resulted in such men abandoning all objectionable practices, and becoming in every sense respectable members of society and welcome candidates for admission to the Association. Reclamation is a far more pleasant duty than prosecution. Unfortunately the advertising quack, with his specious modes of victimising the public, is still in vigorous action. The Association has him in view not without the hope of giving him his quietus. But here the public themselves must be instructed to assist for the sake of their own protection. Argument with the natural quack is simply waste.

> "Let Hercules himself do what he may
> The cat will mew, and dog will have his day."

I have alluded to these points as especially requiring consideration not only by members of the Association, but by every dental practitioner who takes a real interest in his calling, because it will be seen that whilst many large questions are before us, such as those connected with education and examination, and the not improbable necessity in the near future of an application for enlarged authority under the Dentists Act—a proceeding of supreme professional importance—it will be seen, I say, that through the

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influence and agency of the British Dental Association only can these questions be successfully grappled with and solved. If this view of the situation be conceded, it becomes clear that the duty of good men and true is to rally around the Association. The greater the number of its members the greater its power—an observation which has often been made before, but which bears repetition. The roll already includes many hundreds of names and they are annually increasing in number; but having regard to the demands of a pregnant future, there should no longer be hesitation, on the part of those who have hitherto rested content with passive acquiescence in the aims and achievements of others doing the work, in themselves coming forward to lend a helping hand—in a word, to become practical. Good wishes are all very well in their way, but without action they bear no fruit. To all who care for their calling I should like to commend an extract from Dr. Johnson's essay entitled, "The fondness of every man for his profession," written in 1750 and published in the "Rambler." The motto prefixed to the paper, from Elphinston, is, "Choose what you are; no other state prefer." Johnson says:—"The passion for the honour of a profession, like that for the grandeur of our own country, is to be regulated, not extinguished. Every man, from the highest to the lowest station, ought to warm his heart and animate his endeavours with the hopes of being useful to the world, by advancing the art which it is his lot to exercise, and for that end he must necessarily consider the whole extent of its application, and the whole weight of its importance. But let him not too readily imagine that another is ill employed because, for want of fuller knowledge of his business, he is not able to comprehend its dignity. Every man ought to endeavour at eminence, not by pulling others down, but by raising himself, and enjoy the pleasure of his own superiority, whether imaginary or real, without interrupting others in the same felicity. The philosopher may very justly be delighted with the extent of his views, and the artificer with the readiness of his hands, but let the one remember that without mechanical performances refined speculation is an empty dream; and the other, that without theoretical reasoning dexterity is little more than a brute instinct." To this enlightened description of what should be expected of men in regard to the improvement of their callings according to the talents of each individual engaged (published 140 years ago), let me add a few modern words bearing upon the subject of professional responsibility from the interesting presidential address of Dr. Lloyd at the Annual Meeting of the North

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Wales Branch of the British Medical Association, delivered last year. They are these:—

"We are too lethargic in the matter of striving for and protecting our own interests. Medical men would apparently, by their action, make the outside world believe that they were too much engrossed in their daily work to undertake and organise for the protection of their rights and in the correction of manifest imperfections in the laws which affect them. There are hopeful indications that we are gradually acquiring the habit of bestirring ourselves in the cause of our rights and interests. Every member of the profession has a voice in the matters which affect his interests, if he will trouble himself to use it, and it is plainly our duty collectively to make our voices heard when the occasions arise which demand our serious attention."

The aim of all humanitarian effort is the promotion of happiness in the world, an object so noble in itself as to amply repay in its exercise whatever energy may be expended by those who take part therein. Towards the accomplishment of that end, organisations both numerous and varied—religious, philanthropic and scientific—are in busy operation, each with sub-divisions, we dentists being classed as belonging to the field of labour assigned to medical science. In this great field we find conscientious workers manfully doing battle with extant diseases afflicting the human frame; also straining every capacity to discover means of prevention so as to ward these off altogether. Thus, through the faculty have the applications of sanitation, together with the spread of knowledge amongst the people of the principles of rational living, resulted in a marked decrease of average mortality even within the period of our own recollection. There are not wanting scientists, amongst others Dr. Richardson, who consider the present average duration of human life ought to go on increasing until the attainment of 100 years. It is undoubtedly true, whatever sceptics may say to the contrary, that quite a considerable number reach that age or an age closely approaching a century. Leaving alone cases of merely conjectured great ages, there are now living in this country some well authenticated cases of centenarians. I myself not long ago saw an old lady of over 100, the inmate of a Union, with the faculties in good working order. From time to time we read about others such, although generally, perhaps, in the obituary chronicle. Within the last few weeks I have come across a few—one the case of Mrs. Voss, who died on

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the 17th of last month at Shortlands, in Kent, aged 104 years. She had been the mother of ten children, her hearing, sight, and memory were unimpaired, and she was able to read and write without spectacles; another, the Sister Bonaventure, who died at Gand some three weeks back. She was born at Menin, August 23rd, 1788, and had been a Sister of Charity for seventy-eight years, so she would have attained the age of 101 had she lived until to morrow. Then there died on the 10th of April of the present year that very remarkable and well-known man of science, Monsieur Chevreul, aged 102. M. Chevreul retained his faculties and was a regular attendant at the Academie des Sciences and other learned Societies almost to the last. Recent cases might be multiplied, but I must content myself with mentioning two others as illustrating the fact that the centenary age is certainly reached. At Coosat, a village near Athlone, Margaret Mulschill, who is turned over a hundred years of age, gave evidence on Monday, August 12th instant, that is Monday in last week, at a coroner's inquest relative to the death of Honora, her twin sister. The old ladies lived together, and on the previous Saturday, when Margaret went to market she left Honora at home in good health. On returning she found her lying dead on the sofa. Death natural and painless had resulted from failure of the heart's action. John Walsh, an inmate of the North Dublin Workhouse, died only last week in his 108th year. He worked as a labouring man until ten years ago, when he fell in for £4,000. This he entrusted to a friend, who becoming bankrupt, left poor Walsh to finish his days in the Union. In such records we possess a most encouraging incentive to perseverance in pressing on all means likely to swell the roll of the long lived and, perhaps, by-and-bye the statistician will really be able to mark down the average at 100 years. In the meantime I should be contented to see the applications of science so far successful as to place it at the average of the Israelites of old, as recorded by the Psalmist, three score years and ten. There is abundant evidence of the possibility and even probability of that average being reached. When we hear of a well-known statesman of nearly eighty being knocked down the other day in Piccadilly by a cab, quickly recovering himself and overtaking the driver to take his number, it is only to be regarded as an instance not at all infrequent of vitality of those of seventy years and upwards. There are nearly one hundred living people of hereditary title who have passed the octogenarian

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figure, and plenty are to be found in the various grades of society, especially among the class known as annuitants. I dare say Dr. Wheelhouse in his able address of last week before the British Medical Association at Leeds, had in view the idea of a largely augmented lease of life in the world when he referred to the yearly additions to the vast stores of medical knowledge and the mighty work being done in the diminution of pain and suffering—foreshadowing the time when by the spread of sanitary and other sciences the whole human race would be protected from the evil influence of the seeds of disease. At the same meeting, and pointing in the same direction, Dr. Brindley James advocated a measure worthy of all support, namely, the appointment of a Cabinet Minister of Health. In our speciality as dentists, we possess potent elements applicable towards the march onwards. Health and life are dependent upon proper assimilation of food, which requires previous and due mastication. Then we are interested in an especial manner in the question of the improvement through parentage and rearing of the future physical status of mankind—which of course includes the teeth—and of all means to be employed in the process. A single point. In early life wholemeal bread should enter largely into the diet table as containing completely the requirements of perfect bone development. But it is now stated that its consumption is not an unmixed advantage, as the outer cuticle of the wheat contained in the wholemeal bread is of a very irritating nature, and that the phosphates, so invaluable for building up the human frame and contained in the outer covering of the grain, cannot be properly separated and absorbed by the stomach. There is scope then for fuller enquiry as to the proper mode of preparing this food for exhibition. It seems a small matter, but attention to trivials often leads to important results and the attainment of great ends.

Towards the earnest endeavours of the day to add to the public welfare, be it ours as a profession to contribute a large share. There is a cause to work for, for there are means of action at our disposal. By encouraging the one and making good use of the other we may surely indulge the hope of leaving the world better than we found it. Thus will the lines of Edwin Arnold become applicable to each one of us :—

> He dying leaveth as the sum of him
> A life count closed, whose ills are dead,
> Whose good work is quick and mighty, far and near,
> So that fruits follow it.

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In conclusion allow me to thank you for your indulgent attention to the observations it has been my privilege to address to you, and to express an earnest hope that the several arrangements of this meeting will not disappoint expectation, but rather, to adapt to the present proceedings the words of the respected mayor and chief magistrate of the borough on the departure recently of the Shah of Persia, "that you will be enabled to regard nothing as more pleasing than the recollections of Brighton—the sunny town of the south."

Mr. F. Weiss said he hardly thought it necessary to say more than a few words. It was his great pleasure and duty to propose a vote of thanks to their President for the words which he had addressed to them. They knew his practical good sense, and they knew also, and no one knew it better than himself, who had known him for half his lifetime, the goodness of his character, and the ambition that he had from the beginning simply to serve his profession and to do that which he thought would advance not only its interests but its status. He asked them to give their best thanks to Mr. Lee Rymer for his address.

Mr. Williams said he had much pleasure in seconding that vote. He had enjoyed close friendship with Mr. Rymer for thirty-three years, and he could only say that it gave him great pleasure to be present, and to have this opportunity of showing his esteem for their President.

The resolution was carried by acclamation.

The President said he thanked the members most sincerely for their kindness in proposing and carrying this vote. He was very glad that he had been able to come amongst them, and in doing so he knew he was amongst those who were sympathising and kind friends. He had intended some weeks back to endeavour to prepare an address of some interest on the subject of the influence of dental science with regard to a seventy-years' average of human life. From unavoidable circumstances he had only been able to give a little suggestive sketch, but that the attainment of a seventy-years' average was possible he had no doubt whatever, and since composing the paper he had been very much confirmed in his views by what he had heard, especially from the experience of Sir John Tomes. He repeated his hearty thanks. He had now to state that they had amongst them a deputation from Paris. The Committee of Organisation of the International Dental Congress had sent a special delegation. The gentlemen

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present were M. le Prof. Ch. Godon, directeur adjoint de l'Ecole Dentaire de Paris, secretaire général de l'Association générale des Dentistes de France; M. le Prof. Paul Dubois, president de la Société d'Odontologie de Paris, editeur de l'Odontologie; and also M. le Prof. Remonnet, trésorier général de l'Association générale des Dentistes de France. They also welcomed Dr. Bonwill, of Philadelphia. He could assure those gentlemen that they received from the Association a very hearty welcome.

M. Dubois then returned thanks.

Mr. G. Cunningham said he wished to urge that the Association should reciprocate the attention that their French brethren had shown them in coming to be present by appointing an official delegate to be present at the congress that was to take place in Paris, and at which, he believed, a number of societies would be represented from America, Norway, and other countries. Their French friends were very anxious that England should be represented, and they would esteem it highly if any members of the English profession who intended visiting Paris during the congress week—which was to be from the 1st to the 7th September—could be appointed to officially represent the Association. Any member of the Odontological Society, or belonging to that Association, would be eligible, but what they wished to guard against was this, they did not want quacks to go from England and get admitted into societies abroad that they could not get into at home. A bureau had been appointed in England for the purpose, vouching for such of their English brethren as might visit the Congress, and he (Mr. Cunningham) was the secretary to whom application might be made.

Dr. Bonwill (Philadelphia), in response to a call from the chair, said he had to thank the Association very much for their warm reception, and for the kind words which had been spoken. Wherever he had gone he had been met with only one feeling. His visit to England, after thirty years' long work, had been undertaken with the hope of seeing something that would be of value to his fellows at home and also to himself, and if possible to leave behind him some work of compensation, so that his tour might not have been in vain. He had something to show them at the proper time, and he hoped to receive their kind indulgence. He hoped that on returning from their shores he should have a report to take which would repay him for the extra effort of re-crossing the angry channel from Paris in order to be present that day. He

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felt proud of dentistry, and of the wide field that it opened to all who were willing to work, and was glad to find that the time was coming when its practitioners would be hailed by other scientific societies as their compeers in every respect. He hoped that his countrymen and himself would continue to meet with the appreciation and commendation of his English brethren. He had been taken very much by surprise at his cordial reception, which would ever be a reminder to him of the lesson that it was well "to labour and to wait."

The meeting then adjourned for luncheon, which was served in the Pavilion, and re-assembled after having attended the interesting demonstration on "Practical Microscopy" by Mr. Caush.

Afternoon Meeting.

Thursday, August 22nd.

Mr. J. Smith Turner in the chair. The Chairman said they would now proceed with the reading of the papers on Anæsthetics, as announced in the programme.

The Use of Sulphuric Ether as an Anæsthetic in Dental Operations.

By F. R. CRUISE, M.D.Dub., &c.
CONSULTING PHYSICIAN TO THE DENTAL HOSPITAL, DUBLIN.

Gentlemen,—Dr. Stack, knowing that I have paid more than ordinary attention to the use of ether in dentistry, has done me the honour of asking me to write a short paper on the subject, which he kindly promises to read at the meeting of the British Dental Association.

I much regret that an engagement on the Continent, which I cannot possibly evade, disables me from attending the meeting in person, from reading the paper myself, and from taking part in any discussion to which it may give rise.

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I do not intend on the present occasion to occupy the valuable time of the Dental Association by entering upon any collateral topics, such as the chemistry or physiology of the subject. I consider it more suitable to make my brief communication *purely and solely practical.*

It may not be unimportant for me to explain how it came to pass that I acquired a special experience in the process of ether anæsthesia. At an early period of life I was appointed Junior Medical Officer to a large metropolitan hospital, and it was part of my duty to anæsthetise all the patients about to undergo operations. This was in the year 1861, when chloroform was the agent most in favour. A long residence as pupil in the Richmond Hospital had already made me tolerably familiar with the administration of chloroform, and in my new sphere I had most ample opportunities for increasing my experience.

In fine, I may say that for *twelve years* I was constantly engaged in chloroforming patients for operation.

During that period I can truthfully add that I suffered terrible anxieties, so much so that even still I look back upon it with horror. Happily, I never had a death, but I know I escaped fatal results by a very narrow margin on at least three occasions.

Impressed with the great responsibility of my position, I longed to discover some means of inducing anæsthesia with greater safety —to find a drug which would not necessitate unceasing anxious watching of the pulse—and above all, which would not, despite every precaution, take me unawares, as I had often seen chloroform do, so far as the development of most alarming symptoms.

In the year 1871 I had the good fortune to see the late Dr. John Morgan, of Dublin, using ether in the Lock Hospital, and I felt at once that I had seen what I so longed for.

Since then (*just eighteen years*) I have used ether almost without exception in the numerous cases which required an anæsthetic, and in that whole experience I never observed a symptom to cause me grave uneasiness.

Respecting the use of ether in dental operations, I had reason to rejoice especially at its re-introduction in Dublin by Dr. Morgan. These operations are most easily performed in the erect or semi-erect posture—the very position in which chloroform seemed most apt to induce cardiac failure.

So far as my experience goes the invariable effect of ether is to improve the heart's impulse and the circulation generally. More-

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over, the vapour of ether undiluted is practically safe with ordinary attention; while, as we know, chloroform vapour is most dangerous if exceeding 4 per cent. in strength.

I take it for granted that in short dental operations, such as the extraction of one or two teeth which can be removed quickly—say in thirty or forty seconds—without likelihood of fracture or other delay, the most suitable anæsthetic is nitrous oxide. With that subject I have no concern here.

On the other hand, I am strongly of opinion that in prolonged operations, such as the clearing away of a number of teeth and stumps—which occupy from three to five minutes—the inhalation of ether is both safe, satisfactory, and perfectly convenient.

The mode of proceeding which experience has led me to adopt is as follows:—

First, I arrange that the patient shall not have taken food, even liquid, for at least four hours previous to the inhalation. This is the most important condition in order to avoid nausea and vomiting.

Next, I see that the dress is so loosened and arranged that no restraint whatever is exercised upon respiration.

Then, having placed the patient in position, reclining as far as the dentist's chair permits, I stethoscope the heart and proceed to give the ether.

I think it always well to examine the heart, so as to know the condition of that organ, and obtain direction for my movements; but I may add that there are very few, if any, conditions of that organ—short of a state of depression indicating impending death—which would prevent me from proceeding with etherisation.

All being ready I commence to administer the ether. For this purpose I always use Allis's inhaler, which is of the simplest possible construction, allowing of the exhibition of ether vapour, either with the admixture of air, or nearly pure.

This inhaler consists of numerous folds of a cotton fabric, held closely together by a metal framework, the whole being enclosed in an india rubber case open at both ends.

The ether is poured on the cotton fabric, and the outer case being of a shape to fit accurately over the nose and mouth, when it is applied the patient is made to breathe a vapour of mixed ether and air. The latter can be diminished in quantity by closing the india rubber over the free end of the inhaler. All this is very important, as we shall see later. I commence with one ounce

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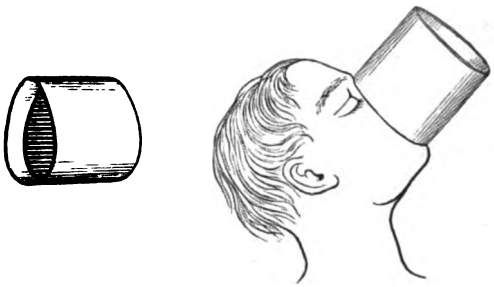
of ether on the inhaler and rarely have to exceed four ounces in any case of etherisation for a dental operation.

If the patient is an adult, and not nervous, I always commence with ether alone. Let me remark here that I always use *pure* ether, sp. gr. 730, and never the methylated kind. The pure ether is less irritant, more effective, and causes much less headache and subsequent disturbance.



Occasionally it is a little difficult to some patients to bear the ether vapour at once, as it irritates the larynx and induces cough and a feeling of suffocation; therefore the inhaler must be cautiously brought over the mouth and the patient encouraged to bear it.

If he does so a very short inhalation suffices to dull the sensibility of the larynx, the head is felt to throb, the face to flush, some vertigo is experienced, the respiration becomes rapid, and then drowsiness comes on. From this moment the ether is borne without inconvenience and may be pressed. This is readily done by pouring fresh ether on the cotton fabric, and by closing over the india rubber covering of the inhaler so as to lessen the quantity of atmospheric air.

In certain cases, especially with children and nervous subjects, female or male, it is not possible to get over this stage without the use of a few inhalations of bichloride of methyline, or the administration of nitrous oxide. Still, this difficulty is rare, and I very seldom find it necessary to resort to anything but the ether alone.

I fully admit that this *initial stage* of etherisation is the one which requires most skill and tact on the part of the administrator. Once passed all the rest is easy. The ether may now be pushed until the stage of "struggling" ensues. A gentle but strong assistant easily keeps the patient in position, and the ether being per-

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severed with complete insensibility comes on, indicated by some stertor, and absence of reflex sensibility of the cornea.

When this point is reached the inhaler may be removed and the mouth opened with the gag forceps, and then the operator may go to work, for from three to five minutes, with the conviction that the patient feels nothing. When he awakes he will assure you of this even though he may have groaned and resisted somewhat.

If the ether is administered in the way I have described I find that an average of five minutes suffices to induce perfect insensibility—the time being, however, prolonged to double that period if resistance is made.

If, during the operation, the patient seems to become partly conscious, I wipe out the mouth clear of blood and saliva, and reapply the inhaler. A very short time now suffices to reproduce complete insensibility.

The operation completed the mouth should be cleansed out with a sponge, the face bathed with cold water, and very soon the patient is awake, feeling somewhat stupefied, and with more or less of headache. The latter is seldom troublesome if pure ether is used, and the inhaler such as I recommend, and not one of the many varieties in which the vapour inhaled is a mixture of ether and the patient's own exhalations breathed over and over again. I have long since abandoned all such contrivances, which, if economical of ether, are certainly not so of the patient's comfort.

It is sometimes objected to ether that it is slower in administration than chloroform, and slower also in recovery. This is a small disadvantage, considering its greater safety, as proved by statistics; but I am not at all sure that if properly handled it requires more time than its more dangerous rival. I lately took ether myself, to avoid the pain of the extraction of a very bad tooth, and I was able to write a letter and see a patient within half an hour of the moment when I sat down to undergo the operation. I cannot say that the after effects were considerably more disagreeable than those I experienced from the use of nitrous oxide on a previous occasion. On many occasions I have entered the dentist's house with patients, and left it with them, all completed, within half an hour. As to the slowness of recovering, if it occurs it causes little inconvenience, as most dentists have a room set apart for patients who require anæsthetics during operation.

A more tangible objection to ether is the nausea and vomiting

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it is liable to cause, even in greater degree than chloroform. This complication may be avoided in nearly all cases.

Firstly.—By arranging that the patient shall not have touched food for at least four hours previously.

Secondly.—By using nothing but pure (not methylated) ether, and giving it as quickly as seems safe.

Thirdly.—By carefully cleansing the mouth during the operation—which can be done with a small sponge held in a suitable forceps—so as to prevent the patient from swallowing the abundant mucous secretion caused by the ether, and the blood caused by the operation. If either the mucus or blood reaches the stomach they will certainly act as an emetic.

It will be asked, what signs should the etherist watch in order to avoid danger to life?

Firstly.—I always watch the heart, and can aver that I have never yet seen it fail under ether; on the contrary its action seems invariably to improve. I do not mean to suggest that if pressed recklessly ether may not so poison the nerve centres as to paralyse the heart, but I believe it will never do so if carefully given.

Herein lies its incalculable advantage over chloroform, which, however carefully administered, will sometimes cause sudden, unforseen, and irremediable syncope.

Secondly.—He should observe the respiration carefully. If any danger exists in etherisation it is certainly here. Occasionally the mouth becomes fixedly closed, and inspiration is impeded. All that is needed is to open the mouth with the gag forceps and draw forward the tongue.

A greater risk arises in those cases where, about the stage of struggling, the chest walls seem to grow fixed, and lividity of the face ensues. I have always found that the removal of the inhaler for a short time, with cold sponging of the face, sufficed to bring all right. Were it otherwise I would at once adopt artificial respiration, but I have never yet been obliged to do so.

Thirdly.—If vomiting occurs while the patient is stupefied with the ether, it is necessary to turn him promptly on his side, and see that the vomited matters have free exit, and do not fall back into the larynx and trachea. If they did tracheotomy might possibly be required. I have never seen such a case.

Finally, it may be asked are there any cases in which the use of ether is contra-indicated. I admit there are some, but very few and far between.

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In cases of operation done by artificial light—a very rare incident in dentistry—its inflammable nature renders ether unsuitable.

In patients with bronchitis, emphysema, advanced Bright's disease, degenerated arteries—which might give way under the increased tension it causes—the risk of etherisation is increased. However, in these cases a severe dental operation is to be avoided altogether, and it seems doubtful whether any other anæsthetic would be practically safer.

In conclusion I beg to thank the British Dental Association for the honour they have done me in permitting me to lay before them my *personal experience*, which has long since led me to the belief that in dental operations *of any duration* ether is the safest anæsthetic, and if properly managed very satisfactory and convenient.

Chloroform.

By W. BOWMAN MACLEOD, L.D.S.

The subject which I have the honour to introduce is one which has given rise to much discussion, and upon which there still remain many conflicting opinions, but I need not say that unless I were convinced of its general usefulness and its special advantages in *certain* dental cases, I would not now venture to uphold its use before this Association, and that too in the heart of a district where it is looked upon by many with trepidation, condemned *in toto* by not a few, and, I may say, avoided by most when any other anæsthetic can by hook or by crook hold out the faintest prospect of enabling the operator to accomplish his work.

Coming, as I do, from the city of the cradle of chloroform, where for the last forty-two years it has been the favourite and universal anæsthetic, and that too not because no other has been sought and no other been tried, but simply because

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no other has yet, after fair and prolonged trial, given so much satisfaction in answering and procuring the true purposes of an anæsthetic, viz., immunity from pain, utter unconsciousness of surroundings, relaxation of muscular tonicity, pleasant recovery and freedom from subsequent inconveniences, and last, though not least, extreme simplicity in its administration and agreeableness in its inhalation.

I grant you that there are many men who occupy most distinguished places in the medical and one or two in the surgical world, who will not admit that by any possibility can any dental operation justify the use of an anæsthetic, the exhibition of which is attended in the slightest degree by a bare possibility of death or of subsequent constitutional impairment, far less one whose track is marked here and there with records of fatal termination. But were this argument carried to its logical conclusion, it would deny the use of all general anæsthetics, the very nature and essence of which is to abolish for the time being the principal functions which guard the vital centre of our animate machine. Now we know that we cannot have the outer ramparts of a citadel removed without rendering it more open to the attacks of the enemy, hence all anæsthetics are more or less dangerous.

On the other hand, we who are dentists know full well that there are many cases which require our operative interference, the pain attendant upon which is almost beyond average healthy human endurance, and which, if inflicted upon a body already weakened by suffering physical and mental, would undoubtedly produce an amount of prostration which might terminate in death, or the recovery from which would be slow and probably imperfect. Under such circumstances it is incumbent upon us as dentists to accept the responsibilities which follow the practice of our profession, and in using an anæsthetic to use that which gives the greatest good to the greatest number.

In the administration of chloroform, as indeed in that of any anæsthetic, grave responsibilities are incurred, and its exhibition should be relegated to the care or guidance of a qualified practitioner who gives his undivided attention to the action of the drug. This being so, in view of the now pretty well ascertained sources of danger and their antidotes, the risk is but small and the attendant good more than amply justifies

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the administration. In connection with this it is curious to note that the authorities of to-day have but emphasised and systematised the methods and rules advocated by Sir J. Y. Simpson and his fellow practitioners, and these are that the drug should be pure, the stomach free from undigested food, the patient recumbent, and all obstructions or possible obstructions to free breathing removed. This then being the condition of the patient the surroundings should be comfortable and the demeanour of the operators and attendants provocative of confidence and no complicated apparatus should be used in its administration. The simpler the means of administering it the better, a folded towel or a piece of flannel stretched over a convex wire frame being all that is required, and not only all that is required, but the best that can be used, as they induce no alarm on the part of the patient, and permit (what is an absolute necessity) the operator to *feel the breathing* of the patient and watch any change of the normal appearance of the face which may presage approaching danger.

The time for operating is when the patient is said to be "under." This is indicated by the suspension of all reflex action except those of respiration and circulation, and can be best ascertained by the condition of the conjunctiva. Any operation before this condition is reached is fraught with danger at any time and more so when the fifth nerve is involved. It sometimes is the cause of death, and under such circumstances the result cannot justly be attributed to the drug.

The dangers and troubles attending chloroform administration are respiratory and cardiac.

The arrest of respiration when sudden may be due to the falling back of the tongue or to the presence of foreign bodies. Narrow the possibilities of such occurrences by removing artificial teeth, &c., from the mouth and having the head well tilted back, though not to the same extent as recommended by Howard, before beginning the inhalation. If they do occur, in case of the first remove foreign bodies at once. In the case of the second turn the head on one side and pull the chin forward or use the glosso tilt of Dr. Foulis, or other convenient means of pulling forward the tongue and opening the glottis. If these methods fail to give immediate relief then artificial respiration must be resorted to. In the case of sick-

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ness turn the patient completely on his side; when vomiting ceases sponge the mouth and resume the chloroform. If the stomach is empty and patient only retches push the administration of chloroform and so abolish the reflex act.

The heart complications are those associated with and those secondary to difficulty of breathing, when the right heart becomes distended and congestion results. The restoration of respiratory action usually removes this dangerous complication, but in especially anxious cases the external jugular vein may be opened, or as a last resort the right ventricle may be punctured, blood withdrawn and the endocardium at the same time stimulated. Should the action of the heart become depressed, as indicated by extreme pallor and weak and intermittent pulse, a hypodermic injection of ether may be given or it may be administered on the towel. Chloroform is contra-indicated only in those suffering from weak and intermittent heart.

The best antidote to all chloroform complications is fresh air.

The advantages attending the use of chloroform in preference to other anæsthetics are extreme simplicity of its administration and agreeableness in its inhalation. It may at first sight appear strange, that in discussing the relative merits of agents, prominence should be given to a method and a quality which have apparently so little to do with the intrinsic qualities or effects of the drug. But we must not forget that in exhibiting drugs to the human being we are dealing with a complex machine in which the psychological plays, if not an equal part to the physiological, at least a very important part, in maintaining or suspending or even stopping its functions altogether. Its simplicity and agreeableness therefore tend to induce a confident and tranquil mind and reduce immensely the probabilities of shock—a cause of death which I think is more frequent than that from the toxicological effects of the drug itself when administered by an expert with an expert's caution.

It does not irritate the fauces nor induce an extra flow of saliva, the latter being a distinct disadvantage in the use of ether for operations in dentistry. It induces a profound narcosis, which, when attained, endures sufficiently long to permit of a very painful and prolonged operation to be

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performed before return of consciousness, or otherwise narcosis is easily maintained without interfering with the free access to the part being operated upon. The usual precaution being taken with regard to food it is very rarely attended with sickness. It affords a pleasant and rapid recovery and is more free than ether from subsequent inconvenience or complications. There is only one pathological condition which contra-indicates its use, and this may be got over in most cases by the prior administration of a stimulant such as alcohol; with ether there are many.

Chloroform has also this further advantage—that the causes and methods of death having been pretty well ascertained it is quite within the power of the skilled administrator to avert fatalities except in those few cases of fright or idiosyncrasy which cannot be eliminated or detected, and which always give a certain percentage to the general as well as the particular death rate.

As an illustration of the first I would again cite the oft-repeated story of the fatal incident in connection with its first projected administration in surgery.

Sir James Y. Simpson was to administer the new anæsthetic. The patient was on the table, the surgeon waiting was ready to begin. A message came that Simpson could not attend. It was decided to operate without anæsthetics. The point of the surgeon's knife had but touched the skin of the patient, his body trembled, he gave one sigh and with that sigh his spirit passed away. Had chloroform been administered, in all probability this patient would not have died; but supposing the end had been the same, one more would have been added unjustly to the present roll of deaths from chloroform and the whole subject of anæsthetics have been retarded for many years. That many an unfortunate termination arising from a similar fear, however induced, that hurried the exit of this patient, has been erroneously ascribed to the toxicological effects of chloroform, may be inferred from the fact that in many instances where death has occurred the apologetic admission has been made that not above a few drops had been given, a few whiffs inhaled ere the collapse occurred. A few whiffs—a mere relaxation of the power of active resistance, an abrogation of the function of the centre which controls the reasoning power, thereby intensifying apprehension

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or fear—the one thing above all others which we should strive to avoid prior to or during the administration of an anæsthetic.*

That the one intrinsic danger attending the use of chloroform approaches through the respiration is a point which was held and taught by Simpson and Syme in the days of its infancy and still continues to be taught by the Edinburgh School of Surgeons, and by a strict attention to this axiom evil consequences may be avoided.

This contention has been disputed, but wherever it has been strictly attended to, good results have followed and its reliableness has been lately further established by a very important series of experiments on animals and observations on the human being by a number of responsible observers known as the Hyderabad Chloroform Commission.

In an address by Surgeon-Major E. Lawrie, Principal of the Hyderabad Medical School and a member of the Commission, he gives the result of 200 experiments on animals and personal observation of its effects on between 40 and 50,000 human beings. The conclusion arrived at by this important Commission is clearly stated in a letter to the *Lancet*, of date May 11th, 1889, in answer to an article in that journal controverting the finding of the Commission, and upholding the theory taught by the English School.

Surgeon-Major Lawrie says:—"The *Lancet* would trust to the heart and circulation for signals of danger in chloroform administration. Our contention is that if the administration is ever pushed far enough to cause the heart to show signs of danger, the limits of safety have already been exceeded and a fatal result must inevitably ensue. So far from disregarding the heart as a factor in chloroform dangers, we say that any affection of the heart, either direct or indirect, is the one danger to avoid. But we say further that the respiration invariably gives warnings when a dangerous point is approached, and consequently that it is possible to avert all risk to the heart by devoting the entire attention to the respiration during chloroform administration."

In conclusion, gentlemen, I would say that no agent has

* Since reading the paper I have been informed by a dentist of a death which occurred in his chair while extracting two loose teeth. No anæsthetic being used.

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been so well abused, so universally used, so misunderstood and hitherto so carelessly handled; and this being so, it is no wonder that so many untoward results have followed in its wake. There still remains the one great broad fact that an equally good and more reliable anæsthetic has been sought and not found. Many have been introduced and their advent proclaimed with jubilation. All have had their prognosticated powers and merits curtailed as experience proved their limitation. Each new general or local anæsthetic has been hailed as the champion which was to unseat chloroform from its throne; yet amid all the din of opposition it has not only held its own, but has gradually and steadily maintained its supremacy, and it remains to this day the one anæsthetic which best meets the varied requirements of *serious*, *delicate*, *intricate* or very *painful* operations, and which, notwithstanding the many charges, mostly unjust or exaggerated, which have been laid at its door, still remains supreme, the one most used by surgeons, the one most appreciated by the patient.

As evidence of its increasing use, as the methods of its administration and its effects become better understood and its purity is reliable, I need only mention that having occasion lately to be in the laboratory of Messrs. Duncan, Flockhart, and Co., I inspected their new distilling apparatus devised and arranged by Dr. Inglis Clark, of that firm—an apparatus which, with mathematical precision, ensures the absolute purity of the drug. I was then informed that for every one hundred pounds of chloroform made by them in 1881, they now turn out one hundred and seventy-five—a broad incontrovertible fact, from which more reliable deductions can be made than from statistical tables, which give relative percentages, and which can, at best, be only drawn from varying and incomplete records.

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"On Certain Anæsthetic Mixtures, with Special Reference to those in Use in Dental Surgery."

By FREDERIC HEWITT, M.A., M.D.Cantab.

GENTLEMEN,—When I was asked to read a paper before you on the subject of anæsthetic mixtures I felt that I should be quite unable, however laboriously I might work at the preparation of that paper, to repay my audience and the members of this Association for the honour which had been conferred upon me. My first impulse was to wade through all that had been written, and after having sifted out those portions of greatest value, to present them to you, supplemented by a few observations of my own. On second thoughts I came to the conclusion that however numerous the shortcomings of my paper might be, it would be better for me to give you the results of practical experience with certain of the known anæsthetic mixtures than to trespass upon your patience by a long discourse concerning the numerous combinations of anæsthetics which have from time to time been advocated and employed. I do not mean for one moment to depreciate the merits of those anæsthetic mixtures which I have not had the opportunity of testing and which I cannot refer to to-day; there may indeed be certain combinations of anæsthetic drugs which possess advantages which deserve wider recognition. Even if I had had practical experience of the thousand and one anæsthetic mixtures which have been suggested, I should not be able, in a communication like the present, to place before you any satisfactory conclusions with regard to the relative advantages of such a huge collection of narcotic agents. With your permission, therefore, I shall almost entirely confine myself to the consideration of two mixtures which, from the point of view of the dental practitioner, deserve special notice. I refer to (1) the mixture of nitrous oxide and ether, and (2) the mixture of nitrous oxide and oxygen; and I shall in conclusion add a few words concerning an agent which, though rarely used in dental surgery, is a valuable anæsthetic, viz., the so-called "A.C.E." mixture.

Mixtures of Nitrous Oxide and Ether.

We are indebted to the late Mr. Clover for this valuable mixture, and I need hardly describe in detail its many advantages. The

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two anæsthetics may be given together, so that a small quantity of ether is added to the usual dose of nitrous oxide, or in such a manner that nitrous oxide is used merely as a convenient preliminary to deep etherisation. Although the administration of the two anæsthetics in combination is usually an easy matter, there are some patients with whom much difficulty may arise in passing from nitrous oxide anæsthesia to that of ether, and I shall refer to these difficulties later on. In dental practice many cases occur in which an anæsthesia of slightly longer duration than that obtainable from nitrous oxide is desirable, and it is in such cases that the addition of a small quantity of ether to the nitrous oxide is to be recommended. If the patient has not taken food for three hours, and if care be taken to prevent him from swallowing blood either during or after the performance of the operation, nausea and vomiting will not occur, save in very exceptional cases. Two or three years ago I conducted a large number of administrations at the Dental Hospital of London, allowing from three to ten inspirations of ether vapour towards the close of the administration of the gas, and I was much impressed at the almost invariable absence of nausea after this small dose of ether. The anæsthesia was appreciably prolonged in these cases; and I am convinced that if there is a probability of the operation lasting more than twenty-five or thirty seconds it is a good plan to add a "whiff" of ether, as it is often termed, to the nitrous oxide. There is no difficulty in administering a small quantity of ether after nitrous oxide, but we cannot always say quite as much as this concerning the transition from nitrous oxide narcosis to deep ether anæsthesia. Whatever means may be devised for the purpose, cases will occasionally occur in which difficulties manifest themselves, and it would be a good plan to attempt to define the causes of such difficulties, so that should they occur we may be able to meet them. The matter is a much more complicated one than would at first sight appear. If nitrous oxide be administered through a face-piece with accurately working valves till the ordinary signs of nitrous oxide narcosis appear, and if ether vapour be now thrown into the air passages without any provision being made for the entrance of even a small quantity of air, respiration cannot and will not proceed. A little reflection will show the reason of this. The oxygen originally present in the air passages rapidly escapes with the nitrous oxide by the expiratory valve; the nitrous oxide itself cannot supply free oxygen; and ether vapour is equally unable

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to do so. It is, therefore, clear that if we wish to pass from deep nitrous oxide narcosis to deep etherisation air must be admitted, and it is upon the regulation of the quantity of air admitted that the success of the administration depends. I believe, as I have elsewhere stated, that the temporary alteration in the rhythm of breathing towards the close of the administration of nitrous oxide is in reality due to an elevation of the larynx as in the act of deglutition—an elevation which causes a mechanical hindrance to breathing by reason of the epiglottis meeting the superior aperture of the larynx. Now this alteration in the rhythm of breathing, accompanied as it is by a characteristic sound, often called stertor, is one of the phenomena due to the deprivation of air, as I shall subsequently emphasise when dealing with mixture of nitrous oxide and oxygen, and so long as air is withheld or nitrous oxide continued so long will the embarrassment to breathing persist. We all know how quickly the peculiar breathing of nitrous oxide narcosis subsides when the face-piece is removed, but if air be not admitted respiratory rhythm will not be restored. Hence in administering ether to a patient who is deeply under nitrous oxide, we shall not be able to maintain breathing unless we occasionally let in air in order to allow the temporary obstruction at the superior aperture of the larynx to subside. I may add that in some cases the admission of ether seems to set up an actual spasm of the sphincters of the larynx, more especially if the vapour be too strong for the patient. I am indebted to Mr. Bailey for the valuable practical hint that in full-blooded patients, whether the operation be a dental one or not, it is advisable to place a small mouth-gag between the teeth before commencing, in order to have free access to the mouth should it become necessary.

I would here point out that if nitrous oxide be given so that, after several expirations have been allowed to escape by the expiratory valve, to-and-fro breathing (as in the use of the "supplemental bag") be permitted, more oxygen remains in the air-passages than if the valves have been permitted to act throughout: and if ether be now admitted, breathing will proceed more freely and the vapour will be respired to a greater degree than under the conditions previously referred to.

Some administrators first place their patient under nitrous oxide and then rapidly change the nitrous oxide face-piece for an Ormsby's inhaler previously charged with ether; and although

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the advocates of this plan urge that no air should be admitted during the change of face-pieces it is, I think, clear from what I have previously said that a small quantity must obtain admission or must be present in the air-passages when the ether apparatus is applied. After having tried all known methods of proceeding from nitrous oxide anæsthesia to ether narcosis I am inclined to think that the question of what kind of apparatus should be used is of small importance as compared to the principles which should be borne in mind in conducting the administration. The administration of nitrous oxide as a preliminary to deep etherisation should, I think, be conducted in the following manner :—1. Nitrous oxide should be at first administered so that the expirations escape from an expiratory valve. 2. Ether vapour should *gradually* be added to the nitrous oxide. 3. To-and-fro breathing of nitrous oxide and ether should next be permitted. 4. During the transition from nitrous oxide to ether *a small quantity of air must be admitted*—if too much be allowed recovery of consciousness will tend to ensue, if too little be given respiration will not proceed. 5. Ether should now be given in increasing quantities till deep anæsthesia becomes established.

Mixtures of Nitrous Oxide and Oxygen.

As an anæsthetic for very brief operations nitrous oxide is, as is well known, a most valuable agent ; but, like all other anæsthetics, it possesses certain disadvantages. Amongst these must be mentioned its power of establishing an asphyxial condition towards the close of its administration. I do not mean to say that the anæsthetic effect of the gas is the *result* of asphyxia—this is quite another matter ; but there is little room for doubt that many, if not most, of the later phenomena of nitrous oxide narcosis are referable to asphyxia, *i.e.*, the deprivation of air, which has by experience been found to be necessary during the administration of the gas. If we do not adopt the precaution of excluding atmospheric air, anæsthesia will be imperfectly established ; the more air admixed with the gas the less pronounced will be the anæsthesia and the less pronounced also will be the asphyxial phenomena. The concurrence of the asphyxial symptoms with the anæsthetic effects has led many persons to attribute the latter to the former ; but, as will be shown, quite erroneously. It is an unfortunate thing that we cannot obtain anæsthesia by giving nitrous oxide mixed with a sufficient quantity of air to prevent asphyxia. In order that

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nitrous oxide may produce its full anæsthetic effect, it is necessary that a particular nitrous oxide tension in the blood should be reached, although it seems probable that this necessary tension varies in different subjects. Generally speaking it may be said that unless the lungs contain a very high percentage of nitrous oxide it will be impossible at the ordinary intra-thoracic pressure for the necessary tension in the blood to become established. The late Paul Bert believed that it was necessary to have 100 per cent. of nitrous oxide in the air cells in order to secure full anæsthesia when giving the gas in the ordinary manner; and for practical purposes we may accept this as a fact. Bert, who was anxious to abolish the asphyxial phenomena of nitrous oxide, ingeniously argued that supposing the ordinary atmospheric pressure to be doubled, it should be possible by administering a mixture of equal parts of nitrous oxide and air, to keep up the necessary nitrous oxide tension in the blood and so to produce anæsthesia, and at the same time to prevent asphyxia. He first of all made experiments upon the lower animals, and used oxygen instead of air. He placed an animal in a closed chamber in which the atmospheric pressure was raised one-fifth, and caused the animal to breathe a mixture of five-sixths of nitrous oxide and one-sixth of oxygen. A very satisfactory form of anæsthesia resulted, and there were no asphyxial symptoms. Subsequently a large closed chamber was made and the foregoing principle applied to practice. Time will not permit me to describe this chamber in detail. I need only say that all those concerned in the operation entered the chamber; the atmospheric pressure was raised to the desired extent; a mixture of nitrous oxide and oxygen was administered to the patient; and the anæsthesia which resulted was as perfect as could be desired. The apparatus was so costly and cumbrous that it soon fell into disuse, although I believe it is still occasionally employed.

Attempts to secure anæsthesia from mixtures of nitrous oxide and oxygen administered without employing a closed chamber have frequently been made both in this country and abroad, but hitherto without much success. At the present time the gases are administered together both in Germany and America; but I have found it difficult to obtain reliable accounts of the methods in use. In a recent number of the *Lancet* (April 27, 1889) I gave an account of the experiments which I have myself made and I need not now repeat what I there brought forward. During the course of these experiments I came to the following conclusions:

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1. That the percentage of oxygen which answered best in most cases was 12·5.

2. That unless steps were taken to slightly force the mixed gases, as it were, into the lungs, imperfect anæsthesia and excitement were liable to arise.

3. That it was possible, with an accurately fitting face-piece and a well-jointed apparatus, to maintain an increased intra-thoracic pressure.

4. That if provision were made for maintaining an increased intra-thoracic pressure nearly every case became satisfactorily anæsthetised.

5. That by the administration of this mixture in the manner described all asphyxial symptoms were prevented and the anæsthetic effects of the nitrous oxide secured.

There is a marked contrast between the anæsthesia of nitrous oxide and oxygen and that of the former gas. With the mixture there is no change of colour of the features; respiration never becomes in any way embarrassed, indeed it is sometimes so calm that it hardly appears to be proceeding; the characteristic jactitation of nitrous oxide is conspicuous by its absence; the pulse is full, soft, regular, and only slightly accelerated; and in the vast majority of cases no noise or excitement occurs. With regard to the anæsthesia produced by the mixture I can only say that it is *usually* of a very satisfactory kind. Corneal reflex is generally not lost, and there is occasionally very slight reflex muscular spasm when the tooth is gripped by the forceps, but I find that patients have no recollection whatever of the performance of the operation, and feel no pain. I have myself inhaled the mixture on two occasions and have been surprised at the rapidity with which I have lost consciousness, hearing, and sight. The oxygen in the mixture seemed to me to permit of my taking deeper draughts, so to speak, than when inhaling nitrous oxide alone; but the sensations during the first few moments of inhalation were very similar to those I have experienced when taking nitrous oxide. The maintenance of pressure during the administration is doubtless the cause of the rapid loss of consciousness. I was thoroughly anæsthetised by the mixture; for, with the exception of the first few seconds, not only did I feel no pain from the repeated plunging of a needle into my hand, but I had no knowledge of the injury being inflicted. I have given nitrous oxide with oxygen in over 250 cases up to the present time;

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in 100 of these I used various percentages of oxygen, whilst in 150 I used 12½ per cent. as above recommended. I am fully aware that a much larger experience will be necessary before drawing final conclusions with regard to the utility of the mixture and I will therefore refrain from any statements with reference to the length of anæsthesia, &c. The period of inhalation which is necessary before removing the face-piece is longer than that required when using nitrous oxide alone—often two or three times as long. Anæsthesia is known to be present by one or more of the following signs :—The extremities are relaxed, the eyelid can be raised with the finger without inducing spasm, the eyeballs are vacantly fixed or present slight movements of oscillation, the patient does not open his eyes when requested to do so, and the respiration is extremely calm. Sometimes slight rigidity of the extremities is present instead of relaxation. Clonic spasm never takes place. The mixture is eminently fitted for respiration by means of its oxygen : indeed I see no great reason at present why it should not be inhaled for a prolonged period, and anæsthesia be thus maintained for a lengthy operation. Experience is, however, necessary to decide this point.

At the conclusion of the preliminary report which I published in *The Lancet* I said that I could not definitely state that every patient would be thoroughly anæsthetised with the mixture administered as described ; and I further mentioned that I was then endeavouring to contrive a portable apparatus for administering the mixture. Since that time I have had an apparatus made which I have brought here with me, and which, so far as I have gone, answers well. Just as there are some rare cases which are rebellious to nitrous oxide alone so I think there will be found cases which will not be thoroughly anæsthetised with the mixture ; but further experience is necessary to prove this. The apparatus which I now employ consists of a mackintosh gas-holder capable of containing about twelve gallons and connected by rubber tubing with iron cylinders for supplying the nitrous oxide and oxygen to the gas-holder ; it is also fitted with an exit tube and stopcocks for transmitting the mixed gases to the face-piece. The gas-holder when expanded is cylindrical in shape, with its axis vertical. It has a circular board at each end, the upper one rising and falling in accordance with the variations in the contents, the latter serving as a stand. In order to prevent swaying of the upper board there is a central vertical

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brass rod fitted to the lower board and passing through a packing box in the centre of the upper board; this rod has eight divisions marked upon it, all of which are visible when the gas-holder is empty and the two boards are approximated. Weights can be placed on the upper board in order to cause the gases to issue under pressure. From the under surface of the lower board an exit pipe passes; this is furnished with two stopcocks near one another; and between the stopcocks are the inlet tubes from the iron bottles containing the two gases. The exit tube of the gas-holder passes to a bag and face-piece, the latter being furnished with inspiratory and expiratory valves. In order to charge the gas-holder the distal stopcock of the exit tube is turned off and the proximal stopcock turned on, thus permitting the nitrous oxide and oxygen to pass into the gas-holder. All gases having been pressed out of the gas-holder, one-eighth of oxygen is thrown into the latter, and seven-eighths of nitrous oxide are then added. The distal stopcock is now turned, and the mixture of nitrous oxide and oxygen (87½ per cent. of nitrous oxide and 12½ per cent. of oxygen) admitted to the face-piece. I have found that a weight of about five pounds on the top of the gasholder answer well; as above explained, unless the gases are administered under pressure failure will result. I would here point out that in the event of the mixture failing to produce satisfactory anæsthesia the administrator can at any moment change to pure nitrous oxide by simply turning the proximal stopcock and throwing in nitrous oxide from the bottles direct to the bag and face-piece. By this plan every patient will be satisfactorily anæsthetised. I do not believe that the mixture will ever entirely supplant nitrous oxide as an anæsthetic in dental practice, but I venture to think it possesses many advantages over the gas. I am myself thinking of employing it in preference to nitrous oxide if I find the apparatus sufficiently portable. I am convinced that it would be far better and safer to use the mixed gases for patients whose respiratory or cardiac functions are in any marked degree impaired by organic disease than to administer nitrous oxide alone and so throw a considerable though temporary stress upon the lungs or heart of such patients.

The "A.C.E." mixture.

There seems to be some doubt as to the originator of this mixture, which consists of one part of alcohol (.795), two of chloro-

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form (1.497) and three of ether (.720). Many other mixtures may, of course, be made with these three agents, but I shall confine myself to the consideration of this particular one, which I believe to be the best. I must, in the first place, briefly consider the objection which was urged by Snow against mechanical mixtures of anæsthetics, and this will lead us to inquire whether such an objection is sufficient to contra-indicate the use of the particular mixture under consideration.

Snow urged that as the constituents of anæsthetic mixtures evaporate at different rates, the temperature remaining constant, patients would at first necessarily receive the vapour of the anæsthetic most readily vapourised in a greater proportion than that in which the anæsthetic existed in the mixture; moreover, after the evaporation of the lighter constituent the heavier would remain and would then be breathed in a very different proportion to that intended. The objection thus advanced by Snow, would seem, at first sight, to be a formidable one. If for example, a mixture be made of equal parts of ether and chloroform, and a considerable quantity of the mixture be poured upon a sponge or towel and administered very much as ether was at one time administered, the patient will at first inhale a vapour which is very largely composed of Ether and will subsequently breathe a vapour very largely composed of chloroform. I am willing to admit this contention, but would submit that it is wrong *to administer the mixture in the manner described.* If instead of administering it as described, very small quantities of it at a time be sprinkled within a cone-shaped inhaler, the objection above cited will cease to exist. I would further submit that all mixtures containing more than an extremely small proportion of chloroform should be administered as if they consisted of chloroform alone; and, *cæteris paribus*, such mixtures must be safer than chloroform.

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Anæsthetic mixtures have fallen into disrepute, because those who have advocated them have regarded them as stable and definite bodies. Taking the "A.C.E." mixture as an example, it should be, I think, regarded as *diluted chloroform.* The diluents used, viz., alcohol and ether, are cardiac stimulants, and hence particularly appropriate. If we regard the "A.C.E." mixture as a stable body, and having poured a considerable quantity of it into an inhaler, administer it as such, and expect to produce a special kind of anæsthesia with it, we shall fall into error, and Snow's objection will at once apply. But if the "A.C.E." mixture be ad-

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ministered as diluted chloroform, Snow's objection need not be considered. Having watched a large number of cases anæsthetised by the "A.C.E." mixture, I think there can be no doubt that the anæsthesia is due to chloroform; and that the alcohol and ether chiefly, if not entirely, act as cardiac stimulants. A little reflection will, I think, tend to show that the quantity of ether in this mixture is insufficient to contribute to any marked extent to the anæsthesia. It is usually possible with an ounce or less of the mixture, administered in small quantities at a time by means of a simple felt cone and sponge, to produce a very satisfactory form of anæsthesia. Now, the mixture contains half its bulk of ether, and any one who has administered ether with a copious supply of air will at once agree that half an ounce of this anæsthetic so administered would go but a short way towards securing anæsthesia. Similarly, we may put the alcohol out of the question. We are in part, forced to regard the chloroform as the active ingredient, The pupil is usually contracted under the "A.C.E." mixture; and with the exception that a little more mucus is produced, that the pulse is fuller, and that the respiration is a trifle deeper, no essential differences between the "A.C.E." narcosis and the chloroform narcosis exist. If we once admit this latter fact we should, I think, administer the mixture *as if it were chloroform*, adding to the inhaler a small quantity at a time, and above all, providing for a copious supply of air. If we employ a drop bottle and some kind of inhaler which allows plenty of air, we shall find a considerable difficulty in anæsthetising vigorous adults, less difficulty in anæsthetising weakly individuals, and less difficulty still in anæsthetising infants and young children. It is hazardous to hurriedly anæsthetise with the "A.C.E." mixture. Hence it is best to commence with the drop bottle and some simple form of cone; should the patient, as is frequently the case, require more of the anæsthetic than can be given from a drop bottle, the cork of the latter may be removed and half a drachm occasionally added to the inhaler; the administrator can subsequently return to the use of the drop bottle when once full anæsthesia has become established. Given in this way and with the belief that we are employing diluted chloroform, I cannot see that the slightest objection can be raised against this mixture. I regard it indeed as a most valuable substitute for chloroform, and every chloroformist should, I think, have at hand this or a similar mixture for employment in certain cases.

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Any remarks concerning the "A.C.E." mixture would be incomplete without reference to the cases in which that mixture is to be recommended. Very young children and persons above 60 or 65 years of age will be found to be satisfactorily anæsthetised by it. It is also of great value in many brochial, pulmonary and pleural affections which would contra-indicate the employment of ether. It must be borne in mind, however, that in some advanced cases of this class chloroform or chloroform diluted with alcohol will be better tolerated than the "A.C.E." mixture. There are many cases of morbus cordis in which the "A.C.E." mixture answers admirably—*e.g.*, those in which ether is contra-indicated by reason of the pulmonary engorgement it produces, and those in which chloroform is inadvisable by reason of its tendency, if incautiously administered, to produce cardiac depression. Persons who are the subjects of extreme obesity will be found to tolerate the "A.C.E." mixture very well indeed, ether being usually badly borne by such persons. I may say in conclusion that one of our London chloroformists (Mr. Moss, of King's College Hospital) is in the habit of employing the "A.C.E." mixture as an anæsthetic for general purposes, and he speaks very highly of it. He tells me he has used it in about 10,000 cases.

Time will not permit me to say more. In concluding this communication I feel that what I have put before you very inadequately covers the ground. There are many more anæsthetic mixtures which deserve attention; but these will, I trust, be fully considered on some subsequent occasion.

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On Recent Researches upon Nitrous Oxide Narcosis, and their bearing upon the Practical Question when and how should Laughing Gas be Administered.

By DUDLEY WILMOT BUXTON, M.D., B.S.Lond., M.R.C.P.Lond.

The questions which practical men ask themselves in considering the value of an anæsthetic, are:

1. Is it efficient?
2. Does its use entail danger to the patient?

I take it we have severally been asked to read papers upon the various anæsthetic substances in order that some comparison may be made between these anæsthetics, and some conclusions formulated upon their individual uses and dangers.

I propose to investigate how far Nitrous Oxide Gas is an efficient anæsthetic, what the limits of its application are; and, secondly, to indicate that it is within these limits a safe anæsthetic.

The audience I address to-day will probably be prepared to accept my last contention, as their experience will have proved to them the extreme rarity of any untoward symptoms occurring under "Gas," but I venture to think that it has only recently been competent for us to explain in a satisfactory manner why nitrous oxide is so safe, and why it is so effectual. Among my medical colleagues, with the exception of those who have gained a special knowledge of the matter, there is still a curious dread of nitrous oxide, and time after time have I been told that Dr. So-and-So considered Miss Blank "not strong enough to take gas." This arises from the fact that the average medical mind regards nitrous oxide narcosis as a modified form of asphyxia, and is prone to communicate this idea to the patient, who very properly translates asphyxia as being smothered or choked. A text book which we find in every student's hand describes, with charming assurance, the action of nitrous oxide as that of an asphyxiant, and recently a venerable and deeply-respected member of our profession, Dr. George Johnson, has promulgated similar views with the weight which his name must always lend to any statement. But nitrous oxide is no asphyxiant, it possesses a specific

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action upon the organism which differs widely from what obtains when an indifferent gas is respired, while oxygen is withheld.

In the course of a prolonged research, the results of which I had the honour of communicating to the Odontological Society of Great Britain, the following facts were pretty clearly made out—

Nitrous oxide does not, to any appreciable extent, split up in the organism; hence its action, if any, must depend upon itself, or upon deprivation of oxygen.

We find by actual experiments that nitrous oxide produces gross changes in the organism.

Thus if the skull of a mammal be trephined, and a sufficiently large window be made in the bone to expose an area of an inch or so across, one is able to watch the pulsation of the brain beneath the dura mater, to observe the colour of the membrane, &c. Under ordinary circumstances there exists, after trephining, a very distinct space between the bony calvarium and the dura mater, and rhythmic pulsations occur bearing a direct relation to the systole, or general arterial dilatation.

It is a simple matter, the muscular system being paralysed by curare, to establish artificial respiration by means of a bellows worked by a water power engine, to ensure a respiration of any rate and depth. Of course the normal rate of respiration during sleep is selected, and by the use of a three-way valve, air can be excluded, nitrous-oxide or other gas admitted, and at expiration the tidal air removed. With this apparatus the following results were arrived at:—The brain, as soon as nitrous oxide was admitted, began to swell up, and although preserving its normal colour for a time, the hemispheres assumed a most remarkable appearance. Simulating a hernia cerebri they protruded into the trephine hole. The colour of the brain now changed from a bright vermilion to a lakey purple. The brain undulations changed in character, becoming less in frequency and amplitude. The volume of the brain increased and at length the movements ceased. The dura mater now was pearly and glistening with a bluish lustre, and upon examination of the vessels of the pia mater, the well-known appearance of commencing stasis was seen. Upon resumption of air and

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shutting off of nitrous oxide, the phenomena above described were repeated, but in a reverse order. The brain undulations increased in frequency and amplitude, the fulness of the hemispheres gradually lessened, and the membranes resumed their ordinary colour and appearance.

Although we are not concerned especially in this connection with the *modus operandi* of the anæsthesia production by nitrous oxide, I will here answer a suggestion which was made some time since, viz., that the brain substance—which as I had then shown swelled considerably—might press upon the calvaria or bony walls, and so a species of compression be established. I, at the time, pointed out that whatever pressure existed was probably interstitial and not found without, but I further tested the question by removing the bony coverings of the hemispheres, and in spite of this obtained the full physiological effects of nitrous oxide.

We will now pass on to consider the spinal cord. Pursuing a similar method, several laminæ were removed from the vertebral column and the spinal cord exposed; in some cases the theca being incised, in others being left in its entirety. Nitrous oxide was then administered and the following phenomena observed:—The spinal cord, just as occurred with the brain, underwent an increase in size, which increase was very prettily evidenced by the overflow of cerebro-spinal fluid.

The difference anatomically between the brain and cord made the former an easier organ upon which to study the changes in the vascular membranes, but no more striking proof of the enlargement of the whole cord could be obtained than that afforded by the outflow of cerebro-spinal fluid which took place as soon as the animal came under the influence of the nitrous oxide.

But to establish the truth of the results thus arrived at it is necessary to obtain them under other and test conditions. Accordingly curare was not used in one series of experiments, while parallel series of experiments were devised in which mouth respiration in some, and tracheal inhalation in others, were employed. It also appeared necessary to grapple with two questions, viz.:—

1. Are the phenomena detailed above really due to nitrous oxide? (2) Or to de-oxygenation of the tissues—apnœa—a

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term, as Dr. George Johnson suggests, more satisfactory than asphyxia?

To deal with the second question, control apnœal experiments were made.

In one series the trachea was tied, while in the other a curarised animal was after a time left without artificially performed respiration, this being done to avoid the dyspnœal struggles, which by their very violence produce a rise in blood pressure and so give an illusory resemblance between the states of apnœa and nitrous oxide narcosis. For particulars of these experiments I would refer to my original papers, and will content myself here with stating conclusions.

Apnœa produces changes far more slowly than those occurring in nitrous oxide narcosis.

The brain and cord, although when much muscular struggling is permitted, undergoing some engorgement and becoming purple and almost black, do not swell up, but actually lessen in volume in apnœa.

The lessening in volume may, provided the apnœa has not been carried too far, be checked and even changed to a state of enlargement if nitrous oxide be administered.

Again, experiments (for details see papers quoted) show, that besides causing anatomical alteration in the spinal cord and encephalic centres, nitrous oxide produces physiological phenomena with which we are familiar in certain conditions of the cerebro-spinal axis, viz.: a loss of certain reflexes, namely, the superficial, such as the skin, and conjunctival, persistence of the patella reflex, sometimes its exaltation, development of ankle-clonus, the occasional development of clonic and tonic contractions, opisthotonos, emprosthotonos, pleurosthotonos, and occasional transient paresis and hemiparesis—all symptoms of extreme significance and interest. About the cardiac and vaso-motorial systems we have very important facts to consider.

Those regarding nitrous oxide as an asphyxiant have been accustomed to caution persons with weak hearts against its use, and indeed, if the term asphyxiant could be correctly applied to it, it would be most detrimental in nearly every form of heart and pulmonary disease.

But having shown that nitrous oxide acts *per se*, and *not* as an asphyxiant, we will give the effects it has upon the heart force and rhythm, and blood pressure.

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There are several *ways of showing the heart's action:* placing the *hand upon the chest, removing the chest wall and watching the viscus* in its pericardium, taking *cardiographic tracings*, and the less satisfactory method of recording the pulse at the wrist or elsewhere, either by the use of a sphygmograph or simply trusting to the finger. The first methods are preferable, but any, if carried out carefully, show that the heart is but little affected by nitrous oxide.

If an animal is made to inhale until the respirations grow slower and slower and finally cease, the heart will be found to beat steadily on in marked contrast to its laboured tumultuous action during the condition of apnœa.

The sphygmograms which are shown and which are passed round show the following changes in the pulse.

FIG. 1.—Normal Pulse. Case 1.

The normal pulse trace consists of the initial rise, as the tidal wave distends the artery, and the gradual descent as

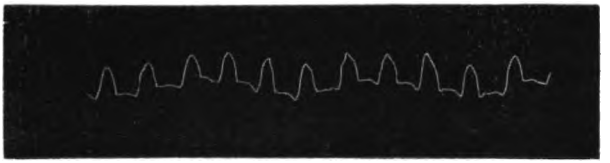

FIG. 2.—Fully under nitrous oxide; shows no tidal wave; marked dicrotism, evidencing lowering of arterial tension.

the tidal wave passes onwards, which descent is marked by secondary waves, these being due, partly to oscillation and partly to reflux of blood driven back by the obstruction caused by the capillaries.

Under gas there appears to be a lessened tension evidencing a lessened tidal wave, this lessened tension being shown by the greater acuteness of the initial curve, the dicrotic wave being placed lower down the curve, and the dicrotism increased, while to the finger the lift is perceptibly diminished.

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These results are most important, and are at variance with much that has been published elsewhere—material based upon the very unreliable foundation of experiments con-

FIG. 3.—Shows gradual resumption of normal characters during "coming to."

ducted upon hospital patients, all more or less under the tyranny of fear or terror.

The rhythm of the heart, at first accelerated, usually returns to its normal rate during narcosis, or drops a few beats.

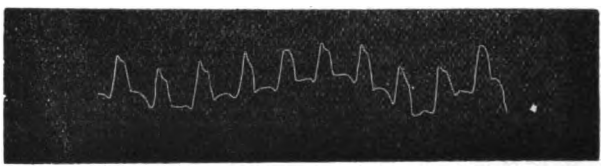

FIG. 4.—Continuation of 3; normal tidal wave re-appearing.

The blood pressure under nitrous oxide must next be considered.

For the first period but little change occurs; later on there is a gradual fall in blood pressure, a fall which, although occurring throughout the whole body, is most marked in the

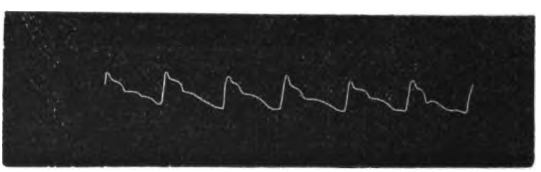

FIG. 5.—Normal trace. Case 2.

splanchnic areas, as is evidenced by the kidney curve shown in the diagram (p. 11.)

Upon the animals breathing air again, a short gradual recovery of blood pressure takes place.

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Control experiments made upon curarised animals showed that when they were rendered apnœic, blood pressure at once rose and became extremely high, while the heart's beats became weaker and weaker *pari passu* with increased blood pressure.

FIG. 6.—Under—shows loss of tidal wave; pointing of apex; respiratory curves exaggerated; shows lowered tension.

Upon respiration nitrous oxide acts as follows :—

The respirations grow slower and at first fuller; as narcosis progresses they become still more retarded, but less full, and

FIG. 7.—Still under, beginning "to come to."

at length they cease. At this point the heart still beats, and if a gentle pressure be made upon the thoracic parietes respirations are resumed, and provided access of air be allowed to continue, consciousness is regained.

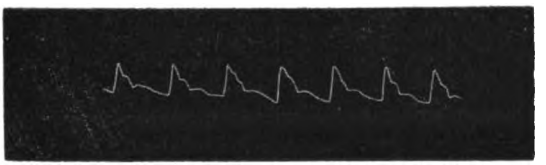

FIG. 8.—Resumption of normal beat.

This is wholly different from the wild convulsions incident upon a corresponding period of apnœa and strongly suggests to the mind that the cessation of respiration under nitrous

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oxide is due to a sedative action exerted upon the medullary centres. Having now reviewed at what, I trust, you will not regard as an undue length the subject of the action of nitrous oxide, I will, with your permission, point out the practical

FIG. 9.—Normal beat, shows tidal wave, aortic notch, dicrotic wave. Case 3

deductions we are justified in making, firstly, concerning heart and vascular diseases.

The heart may be hampered by organic disease; by functional disease; by mechanical displacement. Let us

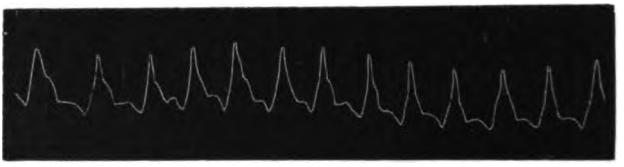

FIG. 10.—Under nitrous oxide. Shows acceleration of heart beats; increased acuteness of curve; diminution of tidal wave; dicrotic wave occurs later, this is shown by being farther from apex.

ask ourselves how far nitrous oxide is contra-indicated in organic heart disease. Broadly, we may consider the matter under two heads.

FIG. 11.—Nearly same as 2, but features more marked.

(1) When the heart muscle is diseased.

(2) When the valves are diseased, although as we are all fully aware, the conditions are only too often coincident in the one individual.

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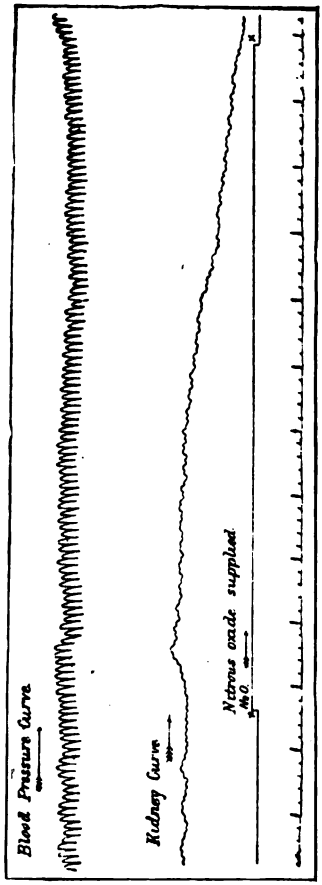
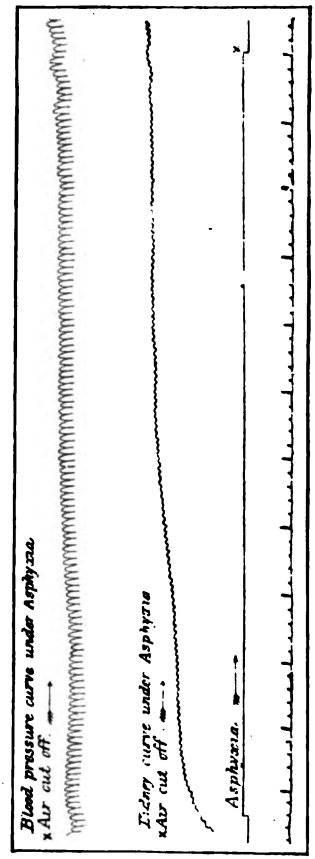
The heart muscle may be enlarged—hypertrophied—with vigorous heaving impulse and displacement of the apex beat, and we know that such a heart is doing hard work against an obstruction existent somewhere in the circulation. Such a heart might exist in granular disease of the kidneys, in



The upper line shows the blood pressure trace taken from carotid.
The second line is taken from the left kidney enclosed in an oncometer and shows the variations of blood pressure in the kidney.
The third line shows the duration of the experiment N^2O being inhaled from the mark x, to the other mark x.
The bottom line is the time marker. The tracings are to be read from left to right—½ size.

FIG. 12.



Upper line shows carotid blood pressure during a period of asphyxia.
The second line shows blood pressure, &c., in the kidney enclosed in an oncometer.
The third line marks (between x, x), the duration of the experiment, and the bottom line is the time marking record.
Tracings to be read from left to right, —½ size.

FIG. 13.

which the arteries impose a severe impediment to circulation. But with the over-growth of muscle we usually have some thinning of the walls of the heart—dilatation. So long as the heart muscle is just able to overcome the impediment the

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patient is, from our point of view, all right; when this compensation fails, the heart overworks, or it is incompetent to properly propel blood through the arteries, its own muscle becomes badly nourished and so yields, dilatation being the result. A person having such a heart takes nitrous oxide and as a result his heart's beats are but slightly accelerated, the blood tension is slightly lowered, while the medullary centres are subjected to the influence of a sedative. If, however, as Dr. George Johnson and others assert, I submit, erroneously, nitrous oxide acts as an asphyxiant, we should have an engorgement of the pulmonary vessels and, as a consequence, a water-logged heart and a patient in urgent danger. To those who, like myself, regard nitrous oxide as a sedative, and a most valuable one, there is no fear of pulmonary engorgement, and, provided struggling and holding of the breath does not occur, the pulmonary circulation goes on with perfect uniformity during the administration.

But another form of disease of the heart muscle has yet to be considered, and one which supervenes upon the condition above cited, when compensation failing, the nutrition of the heart also fails. The myocardium will in very many varieties of disease undergo fatty and other forms of degeneration. The muscular fibres growing fat-laden and feeble are usually but one weak link in a condemned chain, and not only is the heart incapable of doing its duty, but the nerve ganglia and centres are prone to shirk work, and so syncope is ever imminent. There is even in such cases no reason why syncope should be determined by nitrous oxide, and there is certainly less fear of it than from its incidence from shock. I am here speaking broadly and from the point of view of the peculiar action of nitrous oxide. In any very enfeebled individuals I should say clinical experience would decide one in estimating the danger of the anæsthetic. My own experience has been that the cases of syncope one meets with are usually not associated with old fatty hearts, but occur in persons in whom anæmia is present; the tissues, while demanding much, obtain little; and in those whose nervous system is more or less enfeebled.

Of valvular heart lesions we must consider mitral and aortic obstruction, and mitral and aortic incompetence.

Here again were nitrous oxide an asphyxiant we might and

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ought to refuse the solace of gas to patients whose valves were sufficiently diseased to cause symptoms, but as it is not an asphyxiant I have in ordinary cases seen no symptoms the least suggestive of heart failure consequent upon an additional strain. We know that syncope is a frequent and a dangerous symptom of advanced valvular trouble, and upon the frequency or infrequency of these attacks I should decide whether or not to administer gas. There is not any property of gas which would determine syncope in valvular disease.

The group of cases falling under the heading of functional heart disease are far more dangerous. Such cases are those in which the heart's action is weak, feeble, irregular, and of poor tone, the anæmic persons worn out by prolonged disease or debauch, persons of ill-nourished nervous system, who for want of better names are called hysterics—male and female,—hystero-epileptics, the gouty and dyspeptic; those whose failing heart has ever been "assisted" along the downward path by nips of alcohol, *et hoc genus omne*. These persons have nervous systems which will take large quantities of sedatives without much effect; they are timorous, peculiarly liable to fear reflexes, and nitrous oxide has but a transitory effect on their cerebro-spinal axis, and not infrequently baulks us by its apparent failure. Another reason why nitrous oxide is often so unsatisfactory in these cases is that there is commonly a lack of due oxygenation of the tissues in these persons, and so when the full dose of nitrous oxide gas is administered there is a concurrent impoverishment of oxygen which induces an amount of apnœa such as should be absent when gas is properly given.

In our third class of cases we must group displacement of the heart by *pericardial adhesions*, by *pleuritic effusions*, *ascites*, *abdominal or other tumours*. Nitrous oxide gas, from the fixation of the thorax, which the tonic spasm of the muscles may bring about, if that agent is pushed far, would be contra-indicated, and it would be wise, while commencing with nitrous oxide, to continue with ether.

The slight influence which nitrous oxide exerts upon the respiratory system renders detailed notice unnecessary. I have never, in my experience, found nitrous oxide, when pure, act as an irritant, and as this bland gas, as I have endeavoured to show, does not impede the pulmonary circulation,

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there is no ordinary intra-pleural or intra-pulmonary condition which should, in my experience, contra-indicate its use.

How far do conditions due to disease of the central nervous system contra-indicate nitrous oxide?

I can find no record, either in the experience of others or of myself, to show that any organic or functional lesion of the cerebral hemispheres or spinal cord, interfere with administration of nitrous oxide. One would expect from the very marked changes in the vaso-motor areas of the brain and cord which occur under that anæsthetic that whatever condition were brought about by vaso-motor perturbations would be initiated by nitrous oxide, and I believe that this is so in some degree. *Epileptics* and *hysterical* persons are often *deeply impressed* by it, and I have many times been struck by the curious condition which supervenes upon its administration to persons afflicted with *mania*. You are also aware that Dr. Savage who, during his control of Bethlehem Hospital enjoyed an almost unique opportunity of studying the effect of anæsthetics upon the insane, found that in persons who had once been mad, nitrous oxide, ether, or chloroform, would, in a small percentage of cases, give rise to an outbreak—usually transitory.

In the following case, for the notes of which I am indebted to the kindness of Dr. Colman, Registrar of the Queen Square Hospital for Paralysis, there is a record of an instance in which a temporary attack of insanity followed frequent dosage with nitrous oxide.

Lydia Askew, twenty-six. Married. No neurotic heredity could be traced. No previous illnesses. Admitted under Dr. Bastian suffering from diphtheritic paralysis. When convalescent, nitrous oxide was administered to facilitate the extraction of some carious teeth. The extraction proved very difficult, and she was kept, more or less, under the influence of the gas for *about twenty minutes*. Although the apparatus was in good order, and she took a large quantity readily, it was found most difficult to get her completely under, and she afterwards proved that she had heard remarks made, although she felt but little pain. During the rest of the day she was merely rather stupid.

Next morning she thought she was in a "hospital ship," and complained of the motion. Made incoherent remarks when

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asked a definite question. In the afternoon suddenly became more rational, conversed intelligently, but had a wild expression.

During the next *four days*, in the beginning of the morning and late in the evening she relapsed into the previous condition, not knowing where she was and talking nonsense. During the rest of the time she was sensible, but much depressed. On the evening of the *fifth day*, after the administration, she suddenly jumped out of bed, saying she was going to drown herself, and had delusions that her children were dead.

She was discharged on the *sixth* day, in the care of her friends, and taken to the country. About a *fortnight* later she was reported to be as well as ever.

That a small minority of persons suffer from severe headache and temporary nervous paresis after gas, I can well believe, although one is apt to accept the accounts of such cases with a grain of salt. If they exist, they are very rare.

The question has arisen how far are persons with diseased arteries in danger from the increased intra-cranial pressure of nitrous oxide narcosis? Would, for example, a patient who suffered from miliary aneurism of the basal vessels incur a grave risk? The risk certainly exists, but is certainly less than that entailed by the shock of operation without gas, and may, I believe, be incurred in the interests of the patient. Mr. Browne-Mason's interesting case which appeared in the "Transactions of the Odontological Society," is especially noticeable in this connection. I have given gas to hemi- and paraplegics, to cases in which cerebral or cerebellar tumours were present, but in none of these cases have untoward, or even peculiar symptoms arisen.

In conclusion, what practical lessons have these researches taught us as to methods of administration?

The one lesson of all others is: To administer nitrous oxide pure and simple. If you adopt any means which causes your patient to re-breathe exhaled air, you are doing him harm and yourself discredit. All my preceding remarks refer to nitrous oxide narcosis, and not the mixed narcosis of that agent and suffocation. Those who prefer "suffocative narcosis" must please not to lay the flattering unction to their souls that its employment is free from danger. The one great mistake that most observers have made, and which Dr. George

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Johnson has recently rehabilitated, is to confound nitrous oxide narcosis with asphyxia, arguing from the mixed narcosis of suffocation and nitrous oxide to the safe anæsthesia of pure gas. The experiments upon which Dr. Johnson's arguments are based are suffocation experiments, and so far as nitrous oxide narcosis is concerned his arguments are invalidated.

I need not detain you long by dwelling upon the merits of nitrous oxide as an anæsthetic; its range of utility will be sufficiently indicated in the remarks I have made when referring to the diseased conditions of the body in which it can, with comparative safety, be employed. Chloroform, whatever be its merits—and they are many—cannot be used as freely as gas, nor can precautions as to posture, after effects, and so on, be neglected, as we rightly neglect them in giving nitrous oxide. Ether from its offensive flavour, its after effects, and its too violent action upon the blood pressure, cannot be taken in the hundred and one cases in which nitrous oxide proves itself our friend.

Its one drawback is, so I am told, the briefness of the anæsthesia it ensures. But I am not at all sure whether—and I speak under correction—this is not one of its main merits, as it prevents extensive laceration of the fifth pair of nerves in multiple extraction, which in very many cases is, I am sure, not free from danger. But this is not my department, not is it my business to enquire by what means, by mixed narcosis, we are enabled to prolong anæsthesia to a sufficient length of time for lengthy dental operations. I may say, however, that as a rule nitrous oxide alone can be manipulated to ensure a most satisfactory period of anæsthesia, and that I fear there is often too great a tendency to distrust gas alone and to have resort to some form of mixed narcosis, when such is really unnecessary.

Discussion.

Mr. Bailey said, that as dentists he supposed they all used nitrous oxide, and the only question to be considered was whether they should use ether or chloroform. After a very large experience he was very glad to see that, in one

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of the most able papers that they had had for many years in the British Medical Association, Mr. Pridgin Teale gave his verdict after fifteen years' experience most emphatically in favour of ether, when given properly. But ether must be given properly. They had heard a great deal about apparatus, and apparatus they must have if they wished to do the thing well. His friend Mr. Macleod said that chloroform was so good because so little apparatus was required. Chloroform was better given with a very good apparatus. There had been no chloroform giver in the world like Mr. Clover, and his apparatus was perfect. They had now superseded it by using ether, and they used Clover's gas and ether apparatus. Thirty or forty seconds was the length of the time given by Dr. Cruise after giving ether, but surely it was not worth while running the risk of bad sickness for thirty or forty seconds' anæsthesia using ether when they could get quite as much as thirty or forty seconds by simply using gas. With regard to the examination of the heart, he thought it should not take place. A patient came before them to be anæsthetised; the patient expected to be anæsthetised. What were they going to do if they found the heart wrong? They still had to anæsthetise somehow, and therefore if the operator examined the heart and found something wrong, it was likely to make him more nervous. Every patient that went under the influence of ether was dealt with exactly in the same way. He therefore thought they did not gain anything by examining the heart. Dr. Buxton said they might give gas with a diseased heart. He had one distinguished lady as a patient for many years, who would not have a tooth out because she had heart disease. He told her that she had better have a tooth out under gas, that she could not have it out without gas or she was sure to die. She had the tooth out, but three weeks afterwards she died suddenly. Of course if she had died under gas it would have been said that it was the gas. His impression was that in such a case it would not have been the gas that killed her.

There was another question about the suffocating apparatus. That apparatus of Dr. Cruise's was the suffocating apparatus; they could not help having the whole mass of

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ether on the lungs at once, and if any one took three or four ounces of ether on the lungs they would find that the result was suffocation. There was no suffocation about Clover's apparatus; the administration was as easily and as happily done as possible. Then as to the quantity spoken of—four ounces. He was quite sure that his anæsthetic friends would never give four ounces of ether for a tooth; he had never done such a thing in his life. In order to prolong anæsthesia —say from forty-five to sixty seconds—they certainly would not require with proper administration more than half an ounce of ether, which was a very different thing indeed. He was rather astonished to hear that ether was said to be so valuable, because they could have one tooth out, and the patient could do something in half an hour. A little time ago a dentist came to him with the toothache, and they proceeded together to a brother dentist. His tooth was extracted and he went back to a lady on whom he was operating, and she did not know what had happened in the interval. That was not a question of half-an-hour. He thought that perhaps after all the best plan would be to shew the apparatus that he (Mr. Bailey) was in the habit of using. That would be very much more practical to a number of scientific men. As to sickness, it might happen one day that a patient was sick and another day he would not be sick. They could not prevent sickness in any way, but it must not be said that ether was better than chloroform in that respect.

Then as to paralysing the respiration, he was perfectly sure from his experience that ether stimulated the heart, but might paralyse the respiration. In order to obtain any accurate data a very large number of cases must be tabulated. Mr. Macleod spoke really as if chloroform never killed anybody, and as if it was only the fault of the man if he got killed. Mr. Clover gave chloroform 5,000 times, tabulated the results, and out of that number he only had two deaths, so that he got a proportion of one in 2,500.

With regard to ether he did not think that they could make out that there was more than one death in 25,000 administrations even if there was so much as that, and that really settled the distinction to his mind. He should like to add that as to the administration of nitrous oxide no case of death had ever been recorded, although he knew of 250,000 cases of its ad-

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ministration. The Hyderabad Commission had been referred to, but there seemed to be some little mistake as to the way in which that was conducted. The results given were against all the experiments here. The Medical and Chirurgical Society found that the heart was paralysed first. He did not know why their Indian friends should be more competent than their English brethren. They were delighted to see what Dr. Hewitt was doing, and he thought it was for the younger men to look forward to some absolutely perfect anæsthetic. The particular admixture brought forward by Dr. Hewitt looked very well, but he thought he might have made a mistake as to the air given with gas. He had himself kept up the anæsthesia for an operation lasting forty minutes with gas, and air must be admitted under those circumstances. The mouth-piece was taken away in giving gas exactly the same as in administering ether. The reason why one did not use gas for prolonged operations was because the blood changed colour, which inconvenienced operators, and also because of the immense expense it would be. They could not do it in the case of ordinary patients. If Dr. Hewitt could in any way absolutely perfect the apparatus he had brought forward he would be adding a boon to the profession for which they would one day have to thank him.

He had spoken with regard to the colour of the patient. He (Mr. Bailey) never found that his patients got blue. He was never troubled with regard to asphyxia. He knew this, that if they gave ether in the way which he would presently show, patients had no discolouration whatever, and they could carry on the ether after the gas as easily as possible. They all thanked Dr. Buxton for his paper. He had carried out his investigations to a very large extent, and although the paper was complicated and perhaps difficult to understand, he had no doubt shown them what they all wanted to know—that nitrous oxide was a pure anæsthetic independent of asphyxia. They must not be afraid of it. Somebody might die of it; but it would not be by asphyxiation.

Mr. Bailey then exhibited the apparatus by means of which he administered gas and ether. He said it had no inspiratory, but only an expiratory, valve, and that was an advantage over the Clover. The apparatus had an india-rubber air-cushion, so that it would fit absolutely to the face.

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Of course they should have a gag in the mouth, and if they kept the left finger under the chin, they would constantly keep the prop down. His ether apparatus was just as simple as the other. It consisted of a canister, which he filled every morning with four ounces of ether—it would hold six—and that was fixed to his waistcoat. By an arrangement of taps and tubes he could first give gas only. The principle was simply this—first to give a sudden whiff of gas; after that the gas could be turned off and pure ether administered.

Dr. Hewitt seemed to think that the gas could not be given after the ether, but his (Mr. Bailey's) practice was almost invariably to give a whiff of ether for a few seconds and then turn the gas on again. The patient was calm and beautiful, and ten or a dozen teeth could be extracted. There was no complication in the apparatus when it was properly used. He could also, by means of a tap, introduce air, so as to give both air and ether. In a long operation such as abdominal section, they need not give pure ether, but an admixture of ether and air. The apparatus could not be more simple, and if an accident occurred, both hands were left free. With regard to accidents, he thought that in the case of stoppage of respiration, the essential thing was to forcibly compress the chest; by that means they got the gas out of the chest and then they might restore the respiration without pulling the tongue forward or doing anything of that kind. Of course, if the case was an exceptionally bad one, other measures would be necessary. They used the prop in the mouth for dental surgery, but he always kept the prop in the mouth for general surgery as well. The fear of the apparatus had been spoken of, but in his experience he never had a patient who suffered from that fear, or who refused to put the prop in the mouth. He always explained that that was the way the gas was given, and he never found any objection raised. The complication of apparatus was really a great bugbear, but by the means he described the complication was as simple as the towel to administer the chloroform. He should advise Dr. Cruise, if he was going to give ether, to do so with an apparatus of that kind, and he would advise Mr. Macleod never to give chloroform at all for a dental operation. He need say nothing about dangers and difficulties. The difficulties they all knew, and in his experience he had met with cases where he should

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not give gas again. The whole thing was that everyone must learn by experience.

When lecturing at the hospital in Leicester Square, he had always urged upon Students that they must not think that any apparatus was complicated until they had absolutely taken it in hand and seen what it was like. By the use of this apparatus no one was required in the room. There was no heating, no water required. He had heard of a great many people requiring hot water, but he had never used it. If anyone wanted say four teeth extracted he would give gas alone. For the longest dental operation, he would give gas first and then a little ether, and would have the patient ready in a minute and a half. He advised dentists to keep nothing but gas in the house. He doubted whether they should ever keep ether, and certainly not chloroform. He was very pleased to find that one of his friends told him that he gave only gas and that he never had ether or chloroform. Another friend said he would only use ether, but after all it was for each man to do what he thought best. He hoped they would understand the simple manner in which he had been talking, and if he was able to be present at the demonstrations on the following Saturday he would like to show the very easy way in which gas and ether could be given.

The Chairman said they were very greatly indebted to Mr. Bailey for the trouble he had taken in coming down to their meeting, and for the information he had afforded. Their friends had had it pretty much their own way, and he was sure the Association was very much indebted to them. They must not forget, however, when discussing the large number of teeth that could be extracted during an anæsthesia, that there was just the danger of taking out too many teeth at once. He would now suggest that the discussion be adjourned to the following day.

The meeting then adjourned.

At 5.30 a special business committee meeting was held, at which the presence of secretaries of branches was specially requested.

Previous to the garden party and soirée on the evening of Thursday, Messrs. Redman and Dennant entertained a small number of representative guests at dinner at Booth's restaurant in East Street.

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In the evening the members and their friends met again at a garden party and soirée given by the President of the Association and the members of the Southern Counties Branch at the Pavilion. There was plenty of excellent music. The band of the 1st Sussex Artillery Volunteers (by permission of the commanding officers) played at intervals through the evening, while at the other end of the building, under the able superintendence of Messrs. Gates and Roe, a mixed vocal and instrumental programme was performed. At ten or a little after the more venturesome spirits conducted their friends along a mysterious subterraneous passage, emerging finally under the dome, where for the first time in its career the British Dental Association actually danced.

Friday, August 23rd.

RESUMED DISCUSSION ON ANÆSTHETICS.

THE PRESIDENT IN THE CHAIR.

Mr. SMITH TURNER, after recalling to the meeting the general lines of the papers of the previous day, expressed his surprise that Mr. Macleod should have relied upon ether as a restorative in cases of collapse under chloroform. He was pleased to hear both from Dr. Buxton and Dr. Hewitt that so far as any conditions of the heart were concerned, speaking generally, nitrous oxide gas was a safe agent—that if there were any danger at all it was when the functional duties of the heart were interfered with rather than when any fundamental lesion was present. He spoke strongly in favour of paying the utmost attention to the physical comfort of the patient. He thought it would be a good thing if gentlemen who were in the habit of giving anæsthetics and gas would, as Mr. Macadam said he had done so frequently, experiment upon themselves.

Mr. COFFIN said the chief interest of the discussion would, he thought, centre in Dr. Hewitt's paper, seeing that the admixture of one-eighth of oxygen would open up almost a new era in their experience of gas. He understood Dr. Hewitt to say that in the administration of nitrous oxide and oxygen

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in those proportions all asphyxial symptoms were absent, and that the main guide as to the completeness of the administration was the amount of gas which was given. He should like to see how, when gas was given as described, the operator could be sure that the amount he had in the gasholder had really been exhibited to the patient, or how much had escaped from the extra pressure. It was, he thought, somewhat misleading to say that the administration took place under pressure; certainly, it was not strictly so—not in the sense in which Paul Bert and other physiologists referred to it. He thought the expression "intra-thoracic pressure" was not quite scientific. It would seem to be impossible for any additional positive pressure really to exist in the lungs under normal atmospheric conditions. The term seemed to be used somewhat loosely and roughly in this respect, and he should be very glad if it could be cleared up. He watched with great care the exhibition kindly given them, and having timed it accurately he found that from the time the face-piece was removed from the patient absolutely no signs of consciousness were given for fifty-five seconds. At the same time the appearance was so perfectly normal from the beginning that it was almost impossible to realise that consciousness was not there from the moment the face-piece was removed, and that if an operation had been performed it might have been otherwise. He could, however, bear testimony to the fact that for fifty-five seconds there were none of the ordinary symptoms of returning consciousness.

Mr. West believed that dental surgeons were justified in using chloroform when there was necessity. He had experienced unsatisfactory results with ether, but chloroform had in his private practice been eminently satisfactory. The apparatus adopted was simply a convex wire with flannel over it. Of course by that means a large admixture of air was allowed and a perfectly horizontal position. He spoke highly of the value of nitrite of amyl as a restorative in cases of collapse under chloroform.

Mr. Spokes said that chloroform was a very excellent and simple anæsthetic for emergencies in a country district; it was easily carried about, a large quantity was not required, and it could be more easily given than ether. In cases where there was no emergency, since they had at their

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command a safer and a not more unpleasant anæsthetic in the shape of nitrous-oxide gas, he thought it unjustifiable to go out of their way to use chloroform. He would not justify the use of chloroform in dental cases, except in rare instances where it was necessary to get complete relaxation of the muscular tissues—for instance in taking out decayed wisdom teeth. Its uses might perhaps be justifiable for a prolonged operation of that kind, but apart from such cases its use should be restricted to major operations, and then he preferred ether. Ether was a most valuable agent in connection with nitrous-oxide, but for the ordinary run of dental cases they should confine themselves entirely to nitrous oxide with occasionally a little addition of ether. He was in the habit of giving a patient two or three inhalations of nitrous oxide, if necessary, on the same day, with, say, five-minute intervals for rest.

Mr. S. J. HUTCHINSON said that what had to be considered with regard to anæsthetics might be placed under three heads. First, that they should produce complete anæsthesia; secondly, that they should give the patient as little discomfort as possible during the administration and after the operation; and thirdly, that the anæsthetic which was the safest should be used in preference. There could be no doubt that ether did cause a certain amount of sickness, and this was a disagreeable symptom which was very seldom caused by nitrous oxide gas itself. As to the administration of chloroform, other speakers laid stress on the fact that the patient should be in a horizontal position, but they had not also mentioned that everything should be loose about them. That was a most essential condition. Women should not wear corsets, but everything about them should be absolutely loose. One further condition which he commended to his fellow practitioners as an invariable rule was that in these cases they should put themselves out of the way and visit the patients at their own homes. After the operation they could remain on their own beds, and if they were some time recovering from the operation they would do so under the best possible circumstances. If chloroform were given, no doubt Mr. Clover's apparatus, which only allowed a 4 per cent. administration of chloroform, was certainly the safest way of giving it. Dr. Buxton had pointed out in his book on this

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subject that it was the greatest possible mistake to give an anæsthetic of any description on an absolutely empty stomach, *i.e.*, in the early morning before breakfast. Many operators preferred this time for the administration of chloroform, but his own success had been greatest when the anæsthetic had been given at about 1 o'clock or 12.30, just before luncheon time, when some three or four hours had elapsed after breakfast. He was quite sure that the disrepute that sometimes had fallen upon nitrous oxide of making patients sick had been entirely due to the fact that they swallowed blood. They did not like to empty their mouths while riding home, the consequence was they swallowed the blood, and when they got home they were sick. The practical point had occurred to him that if they could stop the bleeding before the patient went home then the nitrous oxide gas would not be blamed at all. With regard to the use of chloroform he must distinctly support Mr. Spokes in saying that it was only desirable to use it in cases where the mouth was being forcibly gagged open for the extraction of difficult wisdom teeth or for some operation which would extend beyond the time requisite for nitrous oxide. He did not however believe that chloroform or any anæsthetic ought to be used for the sake of extracting fifteen or sixteen teeth at a time, because he was quite sure that the number of ordinary teeth that could be taken out under nitrous oxide was quite as much as any patient was able to bear with perfect comfort.

Dr. Stack said that in his opinion the dentist ought to use all the anæsthetics, whether ether, chloroform or nitrous oxide. In his own view, and that of a very large number of dentists, nitrous oxide was not a certain agent on which they could rely for taking out even one difficult tooth. In the case of a badly broken crown or anything of that sort where they had to go after the roots one inhalation of nitrous oxide was in many cases not sufficient to enable them to conclude the operation thoroughly and satisfactorily. He regarded the speed of operation under nitrous oxide as in itself a danger as rendering possible such accidents as the dropping of a tooth into the larynx. He thought that deleterious after-effects might be traced to the use of nitrous oxide, especially in the case of children. He also thought the brief duration of the anæsthesia a grave objection to the universal use of nitrous

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oxide, and deprecated a second administration of the drug. It was useful for short operations only. With regard to ether, it was of all the anæsthetics the most likely to produce sickness, whether they sponged out the saliva or anything else. One point in favour of ether was that it was a stimulant to the heart, and it was a good anæsthetic for administering in the sitting up or upright position. The deaths recorded from ether had proceeded in the main from injudicious administration, from the anæsthetist not knowing what he was doing, and choking the patient by not giving sufficient atmospheric air. Taking all classes of all ages, from sixteen or seventeen up to sixty or thereabouts, ether would seem to be by far a safer anæsthetic to give than chloroform as far as the mortality had gone. Chloroform was also a most valuable agent, and though it had been given and pushed in a great number of cases in the Rotunda Lying-in Hospital in Dublin they had never had a death from it. It was, therefore, absurd to talk of its use as being, in that institution, really fraught with any great peril. Chloroform could be used with safety in the case of young children, many of whom viewed with terror the putting on of the face-piece of the nitrous oxide, and on whose blood the latter agent was by some supposed to act injuriously. He was an advocate for the use of all these agents; every one had its use. He should expunge from the pharmacopœia, as far as prolonged operations were concerned, nitrous oxide, and he thought, contrasting ether and chloroform, they both had their advantages—ether in the case of an adult, and chloroform in the case of a child where the heart was good and strong. As to sickness, there was no doubt far more under ether than chloroform, and it was therefore simply absurd to put aside this valuable agent because there was a chance that in 1 in 3,000 cases it might do some harm.

Dr. Bonwill congratulated the Association on the discussion. If he were to side with any one it would be with Dr. Hewitt in his use of one-eighth of oxygen to seven-eighths of nitrous oxide. His own experiments had taken a line which was, he thought, unique, viz., in regard to rapid respiration as a means of annihilating pain. It had been ascertained by experiment that rapid respiration for one moment previous to the administration of nitrous oxide, chloroform, or ether

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would reduce the quantity required and would lessen the chance of asphyxia. It occurred to him some years ago, that by simply taking ordinary air and increasing the number of respirations from twenty to one hundred, that if he could prevent the heart from corresponding with the number of respirations then he could produce what he would call analgesia or the destruction of pain to such an extent that he could extract a tooth. In a few days he had a chance of trying the operation and it was a perfect success. It took him a long time to believe in it, but since that time he had never extracted a tooth in any other way than simply by rapid respiration, and he had extracted from one to seven at a sitting. His idea was that inasmuch as the heart itself did not increase in the number of pulsations, as he had proved by the sphygmograph, an excess of carbonic acid gas passed into the circulation and, being kept back by the heart owing to the number of pulsations not being increased, produced this effect upon the nerve centres. He quoted several cases in which insensibility to pain had been produced, although the apparatus had been so defective that no anæsthetic had really been administered, and explained their occurrence by the rapid respiration theory. In conclusion he asked that a fair trial might be given to the method of rapid inhalation, and then he could from his own experience assure them of its success.

Mr. Dennant expressed his concurrence in the views of Mr. Spokes and Mr. Hutchinson. He thought, however, after the admirable disquisition they had had from Dr. Hewitt, on the question of a percentage of oxygen added to nitrous oxide they were bound to investigate that subject very closely. It pointed out to them precisely what they very much wanted in connection with nitrous oxide. One weak point in the administration of nitrous oxide was that it was generally given cold, straight from the bottle, which had a disagreeable effect, to say the least, upon the patient. He had always given it from a gasometer, and urged all who could possibly do it to place the gas in the gasometer a sufficiently long time for it to acquire the temperature of the surrounding atmosphere.

Dr. Hewitt said he was extremely obliged to the members for the very kind way in which they had received what was

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really, so far as he could see, merely experimental work. He had laid stress upon the fact that he wished it to be considered experimental up to the present point, for, as they all knew, there were some cases of nitrous oxide in which they could not absolutely depend upon producing a perfectly satisfactory form of anæsthesia, and, so far as he had gone, he believed there were cases in which this mixture would not produce thoroughly satisfactory anæsthesia. He believed, however, that they had in it a means of dealing with nearly every case, and it was a matter of secondary importance to determine the best method to be employed in its use. He wished to say as much as he could concerning the anæsthesia which, undoubtedly, resulted from the inhalation of oxygen and nitrous oxide. He was told that it had been said that patients who had been anæsthetised had said that they were really conscious during the whole of the process. He wished that gentlemen would express those views in public, because he could prove, he thought incontestably, that the patients who inhaled that mixture were, in the vast majority of cases—putting highly exceptional cases on one side—anæsthetised—he would say 99 per cent. He had on one occasion taken the mixture in the presence of two gentlemen, one of whom was counting, while the other pricked him in the hand with a needle, and, as he stated in his paper, he was unaware of the fact of a needle being pricked into his hand and felt absolutely no pain. The want of pain was analgesia, but the want of consciousness was anæsthesia, and he maintained that with this mixture both states were attained. With regard to the signs upon which one should depend when removing the face-piece they were somewhat difficult to determine. In the vast majority of cases there was flaccidity of the extremities. In the early stage there was spasm of the upper eyelid in attempting to raise it, but that passed off, and eventually the eye presented an unconscious appearance. The pupil was not as widely dilated as under nitrous oxide, but it was slightly so, and the eyes were occasionally perfectly fixed in a certain direction. At other times the eyeballs presented slight oscillatory movements. In other instances, instead of perfect flaccidity, there was slight rigidity, and even on the application of the forceps there might be a slight reflex movement of the patient, sufficient to produce a very slight opisthotonic condition, so slight as

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not to be in any way inconvenient. The persistence of reflex action was a most important point. The corneal reflex was usually present, which pointed to the fact that the anæsthesia which was produced was not of a very profound nature. The fact however that the corneal reflex persisted was not a detrimental one; he did not see why it should not persist, and yet the patient be absolutely unconscious. He believed they mostly were absolutely unconscious of everything that was going on, as well as unconscious of the perception of pain.

Mr. Coffin had said that his difficulty was to know when to remove the face-piece—that it seemed difficult to ascertain whether the patient was really anæsthetised. That very difficulty proved the valuable character of this anæsthesia; the patient appeared to be calmly asleep, and those who had been accustomed to see the ordinary effects of nitrous oxide could hardly believe that he was in an anæsthetic state. He regarded that as a very important point, and one on which considerable stress should be laid. He took it to mean that the anæsthesia was of a very perfect type. For a long time people had been trying to get an anæsthesia which was not associated with the peculiar symptoms of nitrous oxide. He did not wish to refer to nitrous oxide anæsthesia as being injurious—he did not think it was. He did not think it was dangerous; with proper precautions one might push nitrous oxide to a very considerable extent; but what he said was that the symptoms at the end of the administration were certainly not pleasant to witness—certainly not pleasant for the patient's friends to witness; and if by any chance it was pushed to too great an extent, those symptoms were likely to culminate in some considerable difficulty of respiration. Those facts must be looked straight in the face. He did not agree with those people who were in the habit of saying "Oh yes, nitrous oxide is a very simple thing." He maintained that, unless it was given with proper caution, it was an anæsthetic which might produce embarrassment to respiration. It was not to the interest of chloroformists to emphasise facts of this description, but at the same time he maintained that unless nitrous oxide was given carefully, it was likely to set up difficulties of respiration, and he frequently heard from those who were in the habit of giving gas that they had met with

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difficulties. They did not hear of this so much in public as in private, but there were the difficulties, and it was those difficulties which he was particularly anxious to face and to actually determine the nature of. That brought him to another point, to which Mr. Coffin referred, viz., the administration of nitrous oxide as a preliminary to ether. Mr. Coffin, and no doubt a great many other people, believed that giving nitrous oxide as a preliminary to ether was an extremely simple business. He believed that in a very high percentage of cases, it was a very easy matter to give nitrous oxide as a preliminary to ether, but cases occurred in which difficulties arose, and when he referred to those difficulties it was with the object of obtaining information from members and others concerning the nature of those difficulties. They occasionally arose in practice, and he wished to know their explanation, so that, should they occur, they might understand them and be able to combat them in the most satisfactory manner. The chief difficulty in passing from nitrous oxide to deep etherisation was in the regulation of the air, which must be admitted, and he thought those who had watched a considerable number of administrations would agree that that was the difficulty. There was nothing given to the patient to support his respiration unless they put in fresh air or oxygen, and it was on the regulation of the quantity of air admitted between nitrous oxide and ether that the success of the administration depended.

With regard to the perhaps injudicious expression "intra-thoracic pressure," he used it because he could not think of a better. He was quite willing to adopt any expression so long as it conveyed his meaning. What he meant was that if the gasometer was weighted each inspiration which the patient took was one in which nitrous oxide was slightly forced into the chest. He thought it was impossible to force nitrous oxide or any gas into the thorax without increasing the pressure. He did not dwell upon the physiological effect which the pressure produced in the blood, indeed he did not know that what he termed intra-thoracic pressure produced very much difference; he only stated as a practical fact that unless pressure was used in giving nitrous oxide with oxygen failure would result. When making the experiments he thought he should be able, by employing two bags, to secure a portable

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apparatus. He had one bag to contain ten and a half gallons of nitrous oxide and a small bag connected with it to contain one and a half gallons of oxygen, the two bags being connected by a large stop cock. The diameters were carefully worked out so that they might contain the volumes of gases in the right proportion. He turned the stop cock and mixed the gases. He found that if he could get an assistant to compress the bags and keep up the increased pressure the cases were satisfactory, but immediately he gave the gases without employing the pressure the cases were unsatisfactory—in other words, that pressure was absolutely necessary in giving this mixture. That was a thing which had only been brought to his knowledge in the last two or three months, and one wondered now why it was not seen before, for he believed that the usual causes of failure on the part of Mr. Coleman and others employing nitrous oxide with oxygen had rested in the fact that the two gases had not been given under pressure.

In regard to rapid respiration, he was extremely interested to hear what Dr. Bonwill had brought before them. They should thank him very much indeed for his remarks, for without the co-operation and assistance of others it was extremely difficult to make any progress. He hoped that members who had the opportunity would not only put into practice and test the efficacy of his plan of inducing analgesia but would also try the effect of nitrous oxide and oxygen. These things ought to be worked out by a great many people, for that was the way to arrive at good conclusions. A man might work long in his own particular groove and arrive at his own particular conclusions without the knowledge of other people criticising him, and he was very likely to fall into error. It would therefore be of the greatest possible use and they would get on much more rapidly if members of the Association and others would actually put into practice or experimentally practise at all events some of the facts which had been brought before them. He confessed he did not see the *rationale* of Dr. Bonwill's method. So far as he could see he should be inclined to regard the analgesic effect as due to some disturbance of the cerebral circulation. The very fact of his finding that it was necessary for the heart not to increase its pulsation to any consider-

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able extent proved that it was an alteration in the quantity of the blood, or some alteration in the blood current through the brain. They knew that if they ran and took very deep respirations they did not get, so far as he knew, into an analgesic condition, and there he imagined the heart's beat was accelerated in a sort of proportion to the respiratory movements. From what he understood Dr. Bonwill to say it was necessary that the respiratory movements should be increased, but that the heart's action should not be much increased; therefore, he imagined, the sudden expansion of the chest must in some way affect the cerebral circulation, possibly by accelerating the return of blood from the brain. He threw this out as a hint because he believed that deep respiratory movements would have the effect of drawing blood away from the brain rather rapidly, and it was possible that that might be an explanation of the phenomena which had been observed.

He wished to say a few words concerning chloroform. Personally he had had some experience with it, and he never employed it if he could possibly avoid doing so. He used ether in preference for general operative surgery. He believed chloroform was comparatively safe in the hands of those who were skilled in its administration, but what he wished to emphasise was this; they were not discussing anæsthetics to be employed by skilled people, but anæsthetics which might be employed by those who had not had very much experience. To put an anæsthetic like chloroform into the hands of any one who had not had much experience in giving anæsthetics was hazardous in the extreme. No one had referred to the "A. C. E." mixture, consisting of one of alcohol, two of chloroform, and three of ether, which was, he believed, one of the most valuable anæsthetics. In cases in which chloroform should be employed in preference to ether it was nearly always possible to give the "A. C. E." mixture, and accidents would far less frequently occur, if it was given with all the precautions with which chloroform was employed.

Mr. Bowman Macleod said he had listened with very great pleasure to the discussion, and was more than satisfied with the acceptance which had been given to chloroform. He was glad to hear that with the exception of one speaker all admitted that chloroform had a place, and a most valu-

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able one, in anæsthesia; and no doubt day by day its place, even in their estimation, would increase, because, as he had said, as the administration of it was gradually leaving the hands of the uninitiated and careless, so were the accidents which accompanied or followed its use becoming less and less. The one great reason why so many adverse cases had been attributed to chloroform was from the fact that it was so simply administered. It was easily given, and therefore it was thought anybody could give it. That fallacy had, however, been found out and acknowledged, and it was day by day drifting into the hands of those who were trained to administer anæsthetics, and so would gradually reach its true and proper place. Although advocating chloroform he had tried at the same time to be as little of a partisan as possible. He simply claimed that when they really wanted the best anæsthetic they could have, that was to say, one that would produce the most profound state of unconsciousness and freedom from pain, chloroform was the one that fulfilled those conditions, and that had been admitted generally in the discussion. Mr. Smith Turner asked how it was that speaking so favourably of chloroform, he should suggest a dash of ether if the heart became depressed. The reason was simply because ether in its first exhibition was a heart stimulant. In a prolonged case of etherisation it became a depressant. It came back very much to the same classification as chloroform, and the action of the heart became depressed, although at a much later stage than in the case of chloroform. By giving a dash of ether if they found a heart becoming depressed they introduced a stimulant which restored the heart to its normal action to a very great extent. He was asked by Mr. Bailey if he never used anything but chloroform. He was not himself an anæsthetist, but, like themselves, a dentist, who operated in chloroform cases while an anæsthetist was giving the anæsthetic. In Scotland of course they did use more chloroform than ether, but with regard to his own practice, and he might say the same of all other dental practices in Scotland, there was certainly much more nitrous oxide given than chloroform, for the simple reason that there were more of the minor operations in dentistry performed than of the major, and in the case of minor operations nitrous oxide was a very useful anæsthetic. He generally administered nitrous

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oxide at his own hand, and his experience was that he had had more cause for anxiety in administering nitrous oxide than he had ever had when an anæsthetist administered chloroform for him. He never had anything very serious, but many anxious moments, and occasionally rather annoying accompaniments. Nitrous oxide was not a profound anæsthetic at any time, and he was glad to hear Dr. Hewitt admit that even with oxygen it did not produce a profound anæsthesia; he thought that the admixture of oxygen, although making it a better, would render it a less safe anæsthetic. The reason why it was so safe when not mixed with oxygen was that asphyxia was produced at a very early stage, and this caused the operator to desist giving it. The patient not being in a profound state of anæsthesia recovered consciousness quickly, and therefore respiratory action, before the termination of life, could take place from asphyxiation.

The latest case they had seen of the sustainment of life for a long period without a fresh supply of air to the lungs was the case of Miss Johnson, who remained submerged in the water at the end of Blackpool pier for three minutes and ten seconds. Prior to that the longest time on record was two minutes and fifty seconds; two minutes might be taken as the average period for which life could be sustained without ordinary respiration. In giving nitrous oxide they had restoration of respiratory action in a very much shorter period, because they could not sustain the anæsthetic condition longer than about sixty seconds at the most. Its very danger therefore, viz., asphyxiation, was curiously enough its very safety in the hands of the ordinary practitioner. With regard to nitrous oxide never producing sickness, Mr. Hutchinson stated it so emphatically that he must not object if he (Mr. Macleod) retorted as emphatically by saying that it did sometimes produce sickness. He had had instances of sickness being induced by the exhibition of nitrous oxide before a drop of blood was shed, so that the blood could not be blamed for having caused sickness in those cases. Mr. Hutchinson also said that it was very much better to exhibit nitrous oxide three or four times if a number of teeth had to be extracted, that was to say, no one should ever take out more than three or four teeth at a time, and that it was actual murder if not worse to take out fifteen or sixteen. He

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differed on that point, thinking that if they extracted two or three normal teeth they could not possibly, especially if they had unconsciousness, produce a worse constitutional state by taking out a greater number, and he believed that without any anæsthetic at all after they had exceeded three teeth if they proceeded to take out more the amount of shock produced by taking out double the number would not double the shock. There was a period when the height of the shock was reached and they could not very well get beyond that till they rose by a bound to another and higher point again, so that they might take it as it were from three to six, six to nine and nine to twelve. The experience of those who had undergone very great shock from the attack of wild animals was, that after the first leap upon their body they were perfectly indifferent to what the ultimate result might be. The shock reached its highest point at the first onslaught, and was not increased by subsequent torture. Then as to the rapid inhalation analgesia of their friend, Dr. Bonwill, it is perhaps all right as a theory; good enough for an exhibition in selected cases, but no use in general practice. So far as I can understand it, it seems to be a combination of asphyxia, exhaustion and faith.

The rapid inspirations are not deep inspirations as Dr. Hewitt seemed to infer; rapid *and deep* are incompatible; they are rapid and *shallow*. The result is that the tidal capacity of the lungs is reduced, and the residual capacity increased. For every expiration given, the inspiration made afterwards introduces a smaller quantity of fresh atmospheric air, the supply of oxygen being thus reduced and the oxygen in the residual air being soon exhausted, partial asphyxia supervenes; prostration or exhaustion follows the violent muscular action demanded by rapid inspiration, and dulls or weakens the capacity of the nerves to convey sensation, and faith glosses the confused and dulled sensation into a painless operation.

The President remarked that in the programme it was said it was hoped that an interesting and valuable discussion would follow the reading of the paper. That hope had been abundantly realised. They were very much obliged both to the reader of the paper and those who had taken part in the discussion for the valuable information accorded, which no

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doubt would be duly acknowledged in proper form by-and-bye. It was particularly gratifying to know that these valuable papers and this useful discussion would not be lost, but would, in the pages of their excellent Journal, go far beyond the present assembly, numerous as he was pleased to see it was.

The meeting then adjourned to luncheon, after which the reading of the papers was continued.

Annual Meeting of the Benevolent Fund.

This was held at 9 o'clock on Friday, August 23rd. Mr. S. LEE RYMER, J.P., President of the Association, in the chair.

The PRESIDENT said that this was the Annual Meeting of the Benevolent Fund, which had rendered extremely useful assistance to the less fortunate members of the profession and to those who came after them and had been deprived of the breadwinner of the family. He would call upon the hon. secretary to read the sixth annual report of the committee.

The SECRETARY read the following report :—

Your Committee beg to submit to the subscribers and contributors of the Benevolent Fund of the British Dental Association their sixth Annual Report, and the Treasurer's financial statement duly examined and certified by the auditors, extending from the foundation of the fund in 1883, to the end of the present financial year, June 30th, 1889.

The general business brought before your Committee during the last year has been of the usual description, several widows and children and dentists having been added to the list of those already receiving help. The new cases have been for the most part of an unusually distressing character, which eloquently illustrates the usefulness and *raison d'être* of the Benevolent Fund. The greatest care and precautions have been taken to fully investigate all applications that have been brought before your Committee, and all have been found to be worthy of assistance.

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As usual your Committee have found in most cases that the best way of arresting family distress is by placing one or two of the children at a good school, where they are not only educated but provided for in nearly every way, and in addition to those who have now been at various schools for some years, your Committee have added several more to their number, and they have much pleasure in stating that all these children are well and happy (no case of illness having occurred amongst them), and that they are also giving every satisfaction to their teachers.

It will be the duty of the Committee during this year to further advance the welfare of some of these children, by placing them in suitable positions, as far as lies in their power, to earn their own livelihood, and so help to permanently overcome the pinch of poverty at home.

Your Committee have already apprenticed a boy to a useful trade, at which he shows every sign of becoming a useful member of society, and earning a good and honest living. This case is especially interesting as the lad has received a most careful training at an excellent school, where he was taught the rudiments of his trade. This apprenticeship will continue for three years, so the whole of this boy's career will have been paid for by the Benevolent Fund, and will act as a model upon which your Committee will be able to mould the future of others in a similar position.

Your Committee again most earnestly appeal to the profession at large, and especially to those who are not contributors, to become so without delay, and so give them a greater opportunity of enlarging their field of usefulness, and to enable them to assist more substantially your poorer brethren to tide over difficulties for which they are in no way to be blamed.

In accordance with Rule XX., this Annual Report is now offered for your approval and acceptance, and a list of subscribers has been prepared and is now open for your inspection prior to publication.

In conclusion, the best thanks of the Association are due to the auditors, Messrs. Ash, Forsyth and Gibbings, for their kindness in again auditing the accounts, and also to Mr. George Jawse, the Hon. Accountant, for his generosity in so ably preparing the balance sheet.

(Signed) S. Lee Rymer,
Chairman.

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Mr. MORTON SMALE said he had great pleasure in moving the adoption of so satisfactory a report.

Mr. REDMAN seconded the motion.

The PRESIDENT, in putting the motion to the meeting, said he thought the report spoke eloquently for itself and showed the eminently practical nature of the work which was being carried out under the operation of the Fund.

The motion for the adoption of the report was carried unanimously.

The PRESIDENT said that in the regretted absence of their worthy treasurer (Mr. Alfred Woodhouse) he would ask Mr. Hutchinson to be good enough to read the financial statement.

Mr. HUTCHINSON then read the Treasurer's report :—

GENTLEMEN,—Being unable to personally attend the annual meeting of the British Dental Association, I again give you my financial report in writing.

On the whole I may congratulate you on our position, for we have not lost ground, though I regret we have not gained much, and the money you have entrusted to us has, I am sure, been expended carefully, and I think well; this is to a very great extent due to the care taken by our Honorary Secretary, Mr. George W. Parkinson, in investigating each case and almost always having personal interviews with those seeking our aid.

You will find the exact statement of our position in the accompanying balance-sheet; but I will go through the items, as I may thereby throw some light and interest into the matter.

Our receipts from all sources for the year ending June 30th, 1889, were £399 1s. 1d. This compares apparently badly with those of the preceding year, which were £426 1s. 11d.; but this increase was due to the special effort successfully made to raise the invested capital to £1,000, as a commemoration of the Jubilee year; so considered, our receipts for the year must be considered satisfactory.

The above amount, £399 1s. 1d., was made up as follows: Donations, £129 2s. 7d.; subscriptions, £243 5s. 6d.; interest on capital, £26 13s.; total, £399 1s. 1d. In addition to this we had in hand at the commencement of the financial year £253 17s. 4d., making a grand total for the year of £652 18s. 5d.

This amount was disbursed as follows: Benevolent allowances, £251 15s. 4d., this is a few pounds less than the money so distributed last year; printing and stationery cost us £8 13s. 7d.,

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and postage and miscellaneous expenses £5 18s.; and money invested £101 8s. The cash in bank is £246 0s. 2d., almost the exact amount as when I made my last report. The cash in the hands of the hon. secretary for weekly payments was £39 3s. 4d. These disbursements give him very great trouble, but he does it most cheerfully.

I must draw special attention to the subscriptions for this year as compared with last year, for they show that we need increased effort on the part of the friends of the Fund to keep up and increase its income. Each year some of our old supporters drop off from one cause and another, so that it is quite necessary to find new ones to take their places.

We have, I am pleased to say, a fresh source of income, to which we owe the fact that we are not behind the receipts of last year. Mr. Booth-Pearsall suggested some months ago that a box should be placed on the table at each meeting of the various branches of the British Dental Association and of the Representative Board, in which members could place any sum they liked. The aggregate of these collections was the sum of £21 12s. 3d., a very good addition to our income, and we have not only to thank the donors but also Mr. Pearsall, who first suggested the plan and carried it out.

I am, Gentlemen, yours faithfully,

A. J. WOODHOUSE.

Mr. DENNANT, in moving the reception and adoption of the Treasurer's report, said that when they saw that so much good and solid work had been done by the committee during the year at the nominal cost of about £13, they must all feel they owed a debt of gratitude to them for husbanding the resources of the Fund so admirably.

Mr. BAYFIELD seconded the motion.

Mr. HUTCHINSON said he should like to make one or two remarks on the report. The Treasurer had referred to the difficulty in getting fresh subscriptions. He (Mr. Hutchinson) wished to take the opportunity of doing privately what he was then doing publicly, and that was of suggesting to the Executive of the British Dental Association whether they would allow the members of the Benevolent Fund to have printed on the slip which the Treasurer of the Association sent out every year a line, and then a blank for the figures to be filled in, in which should appear the words:—"Subscriptions to the Benevolent Fund." He

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thought that might assist them in getting some additional annual subscriptions. They really had no means of reaching each individual member of the Association except by some official plan of that kind. He hoped the Association would permit some such notice to be sent out. It might read somewhat in this way:—"Annual subscriptions for the year" . . . due such and such a day. Then another line:—"Subscriptions to the Benevolent Fund of the British Dental Association." Then a blank to be filled up. By that means the Treasurer would receive in many cases the total sum for the two subscriptions, and then divide the amount according to the proper proportion between the Association and the Benevolent Fund. He trusted they would be able to induce the Treasurer (Mr. Canton) to take that additional trouble on their behalf, and he hoped they would be able to bring the scheme into some definite form before next year.

Mr. M. Henry said he presumed, as was the case last year, the need for help was greatly in excess of the supply.

Mr. Canton said there would be no difficulty at all about having a slip with the two subscriptions printed on it. He would be very happy at a later period to talk the matter over with Mr. Hutchinson.

Mr. G. Henry asked whether collecting boxes were used in connection with the fund.

Mr. Hutchinson thought that collecting boxes had appeared at all the meetings except the present one.

Mr. G. Henry said he referred to private boxes. Cases occurred in practice where no fee was charged to the patient but the patient himself would rather pay something. They might then call the patient's attention to the Benevolent Fund box.

The Secretary (Mr. George W. Parkinson) said that the boxes referred to by the last speaker could only be used for collecting hospital funds and not for the Benevolent Fund, which was essentially a charitable institution.

Mr. J. Smith Turner said that they could appeal with confidence to the public in support of their hospitals, but he did not see what right they had to go to the public and ask for help for their indigent brethren. He thought it was a matter that belonged solely to themselves.

Mr. Dennant said that if no special effort had been made to supply boxes at the annual meeting it was because they thought the annual meetings of the Association had been rather used up in

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that direction. Special efforts had been made, and he was sure members were not a little tired of it. They thought that a good round collection at the dinner would make up for other deficiencies, and would certainly save a great deal of trouble in making any special effort.

Mr. HUTCHINSON said he was sorry the Treasurer had not made his statement in detail as he had done last year, and personally he was afraid he could not give such details. He thought that at the dinner in the evening it would be possible to allude at more length to some of the cases. They were not allowed by the bye-laws to mention names, but Mr. Parkinson could tell the members present the details of the sort of cases they had on hand. He assured them that they had to husband their resources very cautiously, and they were unable to make anything like the grants they should like to do. Mr. Bowman Macleod, and Mr. Waite, of Liverpool, had both acted as almoners on behalf of the fund recently, and they could both say from their personal experience how grateful the recipients had been and how absolutely necessary were further subscriptions to the fund.

The PRESIDENT, after a few remarks, put the motion for the reception and adoption of the Treasurer's report.

The motion was carried unanimously.

The PRESIDENT said that the next business was the election of two gentlemen on the committee in the place of the retiring members, Messrs. J. Browne-Mason and Fenn Cole. The list was before them to elect from, and the names of any other subscribers that might occur to gentlemen present could be put down. It was, however, very desirable to elect gentlemen who could attend the meetings. There was a difficulty sometimes in forming a quorum, which consisted only of three, and as a rule it was the three same gentlemen who met from time to time. It would be most advantageous to elect gentlemen who could attend a little more frequently, because the present condition of things was placing a great strain upon those three gentlemen. It was hardly to be expected that gentlemen living a hundred miles away could attend at any time, therefore the question was whether it would not be desirable to elect two gentlemen in London who were on the scene of action, and who in case of great need could be summoned together at a moment's notice.

Mr. DENNANT said that having served for some years on the Committee he knew something of its working, and had a very

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strong feeling in the matter. This should be unlike the composition of the Representative Board, which should be distinctly representative of the Association, but in an administrative fund like this, where the members of the Committee wanted to be constantly in attendance and to have an intimate and special knowledge of all the cases that came before them, cropping up as they did from time to time, it would be of considerable advantage to the Fund if they could secure gentlemen on the Committee who would be constant in their attendance. In his opinion it would be distinctly better for the Fund if two London men were selected. He did not think that any gentleman, whose name was on the list, residing a long distance from town, would object to be set aside in order to secure the better management of the Fund. He did not think it necessary to propose any names other than those on the list submitted to the meeting.

Mr. MACLEOD said he thought it was quite possible to have a provincial man who did not live a great distance from London and who had the object of the Fund very much at heart, and took an interest in these matters to the extent that he would put himself out to come to London to attend the committee meetings. There was the name of one provincial gentleman on the list, who, he was convinced, took a great deal of interest in the matter, who was frequently in London, and would be likely to attend the meetings of the Committee. They must not, therefore, ignore provincial men altogether. He referred to Mr. Brunton, of Leeds, who, with his wife, took a great deal of interest in the work.

The PRESIDENT said that if Mr. Brunton would be able to attend, he would be a very valuable addition, and he (the President) thought there would be no doubt as to his unanimous election.

Mr. HUTCHINSON said that, without prejudicing the case in any way, he would point out that in the rules, as proposed to be altered at that meeting, provision was made for the Hon. Secretaries of all Branches to become *ex-officio* members of the Committee. In addition to that there was a proposed alteration in Bye-law 18 to the effect that the Committee of Management shall be empowered to write to the President and Hon. Secretary of each Branch to act as a Local Committee. Vigorous provision was thereby made for the working of the Benevolent Fund all over the kingdom. He pointed that out to show that they had acted in the spirit which Mr. Macleod had so well advocated.

The ballot was then taken for the election of two members on

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the Committee, and Mr. Ashley Gibbings and Mr. Howard Mummery were elected to fill the vacancies.

Mr. REDMAN said that amongst the letters he had received that morning was one from a gentleman residing in Brighton, Mr. R. Tillston, thanking them for their invitation on the previous evening and regretting his inability to be present, but enclosing one guinea towards the funds of the Association. He (Mr. Redman) did not think the gift could be put to a better use than to be handed over to the Benevolent Fund.

Mr. HUTCHINSON said he had been requested by the President to read the proposed alterations in the Rules. The first alteration was in Rule VI., in which the words, "unless otherwise directed by the donors" were proposed to be put in a parenthesis. He would propose that that alteration be made.

The motion was adopted.

Mr. HUTCHINSON proposed that Rule X. should read as follows (the alterations are printed in italics):—

"The affairs of the Fund shall be conducted by a committee of management consisting of *not less than* ten members and composed as follows: the President for the time being of the Representative Board of the British Dental Association (if he be eligible as a contributor to the Fund), the three Trustees, *the Treasurer and the Hon. Secretary of the Fund, and Hon. Secretaries of Branches, the latter being ex-officio members*, and six contributors to the Fund of not less than £1 1s. per annum, and donors of £10 10s. and upwards in one payment, or £5 5s. in two consecutive years, being also members of the British Dental Association, two of the latter of whom shall be members of the Representative Board of the Association. . These last-mentioned six members may serve for three years from the date of inauguration of the Fund, at the expiration of which period one-third of the members shall retire according to seniority of election. *After the third year one member shall retire annually, according to seniority of election, and shall be eligible for re-election.* The Committee shall elect a Vice-Chairman from amongst themselves, also a Treasurer and Hon. Secretary, subject to the confirmation of the next general meeting of the subscribers of the Fund."

The motion was agreed to.

On the motion of Mr. HUTCHINSON, seconded by Mr. REDMAN, Rule XI. was altered as follows:—

"The Committee shall prepare and cause to be issued to the

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contributors to the Fund one week at least before each Annual General Meeting, a list of persons eligible to serve on the Committee for the ensuing year, if any vacancies exist, stating the name of the member of the Committee who retires. The list shall contain the names of two members of the Representative Board, being contributors to the Fund, and six other contributors to the Fund, being members of the British Dental Association."

Mr. HUTCHINSON moved and Mr. REDMAN seconded that Rule XII. be altered to read as follows:—"At the annual election every voter may erase any name or names from the list, and may substitute the name or names of any other person or persons eligible to serve on the committee, but the number of names on the list after such erasure or substitution must not exceed six, including at least two members of the Representative Board. Those lists which do not accord with these directions shall be rejected by the scrutineers."

Mr. BRUNTON hoped in future when an important matter such as the alterations of rules was to be discussed that the proposed alterations would be placed in the hands of the members previous to their coming to the meeting. On the present occasion they had hardly had the opportunity of grasping the meaning of the alterations.

Mr. WEST moved that the alterations of the Rules be referred in bulk back to the committee to be reconsidered on a future occasion.

Mr. BRUNTON seconded the motion.

The PRESIDENT said that Mr. West could only move that the remaining alterations in the rules be referred back, as some of the alterations had been already adopted. If such a course were pursued the whole matter would be postponed for another year. The proposed alterations were merely formal.

Mr. WEST said he thought there was a very radical alteration in Rule X. On one column it said that the retiring person shall be ineligible for re-election, but the alteration was that he shall be eligible. That, he thought, was a very substantial alteration.

Mr. DENNANT said that that question was submitted to the meeting last year with great force and emphasis. As far as he could throw any emphasis into it he had been very strong on that point. From the very foundation of the Fund he had felt that it was extremely important that the men who took part in the administrative work should be eligible for re-election on account

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of the nature of the work He regretted that the matter had not been brought forward earlier so that it could have been carried at the meeting last year. It was then proposed that the question should be postponed for a year. The time had expired and the rule had been altered accordingly.

Mr. J. S. TURNER said that the Journal was the proper medium to be made use of for the purpose of calling attention to proposed alterations and other cognate matters.

The HON. SECRETARY said that a notice of the proposed alterations had appeared in the last Journal.

Mr. Hutchinson's proposal that the new rules be accepted *en bloc* was then put and carried.

On the motion of Mr. HUTCHINSON, seconded by Mr. MORTON SMALE, Mr. Dennant was elected as auditor for the ensuing year, as was also Mr. West, proposed by the PRESIDENT, and seconded by Mr. REDMAN.

The PRESIDENT said the next business they had to perform was a very pleasant one; it was to pass a vote of thanks to their valued and esteemed officers, the Treasurer and Hon. Secretary. It was not necessary for him to say anything in their praise for the manner in which they had fulfilled the duties of their offices, as it was so well known to all the members. He begged to propose, "That the cordial thanks of this Benevolent Fund be accorded to the Hon. Treasurer and Hon. Secretary for their valuable services during the past year."

Mr. DENNANT seconded the motion, which was carried by acclamation.

The HON. SECRETARY (Mr. George W. Parkinson) begged to thank the meeting for the kind way the vote of thanks had been proposed and accepted, and he wished to inform those present that the work done for the Benevolent Fund by his colleague, Mr. Woodhouse, and himself, was a labour of love, as by any inconvenience they were put to they felt they were doing something for the benefit of the profession at large, and as long as they were entrusted with the affairs of the Fund, they would try to do in the future as they had endeavoured to do in the past "their very best" for the benefit of their poorer brethren and for the prosperity of the profession, which they all had so much at heart.

Mr. HUTCHINSON proposed a vote of thanks to the President of the Association for so kindly taking the chair on the present occasion.

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Mr. G. Henry seconded the motion, which the President acknowledged and the meeting terminated.

Evolution Illustrated by Teeth, being a Comparison of the Teeth of Tertiary Mammals with those of the present Day.

By JOHN HUMPHREYS, L.D.S.

The science of odontology has proved of enormous value to the comparative anatomist, in enabling him to conjecture and theoretically to articulate the frames of those strange creatures which inhabited this planet in primæval ages.

The great Cuvier is stated to have exclaimed: "Give me a tooth, and I will restore the animal skeleton from which it was derived," and this was almost literally true, for his conclusions from the study of one or two fossil teeth were almost invariably correct, as proved frequently by the subsequent discovery of the entire skeleton.

The study which he so ably commenced has been continued by our distinguished naturalist, Owen, whose works are monuments of marvellous skill and patient research, in unravelling the secrets of a fauna probably millions of years before the appearance of man and the present diversified forms of the mammalia.

Since Darwin's works appeared, and more especially since his book on the "Origin of Species," by natural selection, was published, an entirely new light has been thrown upon facts which have been strange puzzles to generations of by-gone naturalists. The modern school of evolutionists have applied themselves particularly to elucidate the problems connected with the mammalian frame, from the lowliest creatures to man, the highest development of the animal kingdom, and more especially with regard to the possession of certain muscles, and the variations in the forms of particular bones and other structures, which are apparently useless, but which point distinctly to evolution from a

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different ancestral form. And the teeth, as I have just stated, perhaps more than any other part of the animal mechanism, are most instructive, and afford a wide field for speculation and research.

In examining the skull of a whalebone whale one is at once led to theorise upon the different habits and environment which have caused such a remarkable change in its dental apparatus.

Instead of teeth, an elaborate arrangement of whalebone plates occupy the upper jaw, and act as a gigantic strainer, intercepting the prey swallowed in each mouthful of sea water.

But in the fœtal state the germs of mammalian teeth are developed in shallow grooves, though they never calcify, and are speedily suppressed, as they would be useless to the creature in its present mode of life and diet.

One would wish that science could pierce the veil, and reveal to us the life of this huge monster in bygone ages, when it was probably amphibious in its habits, inhabiting the marshes and river margins of the primæval world, somewhat like the hippopotamus of the present day.

Of all the aquatic mammals we may ask the same question—from what ancestral types have they differentiated?

The ornithorhyncus has remained a scientific puzzle until quite recently, by reason of the horny plates occuping the incisor and molar regions, until at the commencement of last year Mr. Poulton, F.R.S., had the good fortune to examine some young specimens in the museum at Oxford, and discovered, apparently under the cornified plates, the germs of true mammalian teeth, revealing its higher origin. What strange phases must have occurred in its life history to have produced the present degraded duck-billed creature.*

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* Since writing the above I have had the good fortune to read in the May number of the Proceedings of the Royal Society, a paper written by Mr. Oldfield Thomas, of the Natural History Museum, South Kensington, on the "Dentition of the Ornithorhyncus."

The skulls previously examined by Mr. Poulton were from very young specimens in the Oxford Museum, but those at South Kensington were from more developed animals, about one-third grown.

The conclusions he arrives at are still more remarkable, viz., that the ornithorhyncus, like all mammals, actually possesses true teeth in the early part of its existence; the specimens seen by Mr. Poulton were so young that the germs of the teeth could only be seen confined in their sacs, covered by

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The minute and apparently functionless pre-molars in the fruit bat, the tiny pre-molars of the squirrel, and the small pair of teeth behind the formidable upper incisors of the hare and rabbit, most eloquently proclaim the story of a change from a more numerous to a limited dentition, from a general to a highly specialised tooth development.

The laws of evolution which most directly concern us as odontologists are "the survival of the fittest," and "suppression of parts from disuse."

Stretching far back in the history of time, probably millions of years before true mammals appeared, as low down as the Trias, we find remains of small warm-blooded creatures of marsupial type co-existent with the great reptiles. They were probably, from the nature of their teeth, of insectivorous habits, or preyed upon the small lizards which abounded at the period, and bore a strong resemblance to the present Australian insectivorous marsupial myrmecobius. They first appear in the Trias, represented by a small mouse-like creature, the microtestes, which has the proud distinction of being the oldest known warm-blooded denizen of this planet.

From the Oolite slate have been discovered jaws of the amphitherium, which, like its living representative myrmecobius, possessed the abnormal number of six pre-molar and six molar teeth on each side of the jaw.

The phascolotherium from the Stonesfield state presented a similar pattern of teeth, but the pre-molars are reduced to three, and the molars to four. The Purbeck beds furnished the jaws of

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epithelium, but Mr. Oldfield Thomas demonstrated the actual teeth with well developed crowns and good roots, which were erupted and fixed in alveolar sockets just like other mammalian teeth.

As the creature subsists upon aquatic vegetation, the crowns become worn down speedily from the intermixture of sand and grit, and as they do not grow from persistent pulps, are soon reduced to a thin film, and at the same time extensive absorption of the roots takes place, and the teeth are lost in its very early life.

But Nature comes to its assistance in a very curious manner, for in the meanwhile, the oral epithelium dips down underneath the teeth and fills up the spaces left by the absorption of the roots, until when the teeth are thrown off the alveolar cavities are filled by it, and it is afterwards cornified into the horny plates, which have long been a puzzle to us, and which are none other than cornified epithelium.

The true teeth are covered with minute cusps, and approach more nearly in form to the microtestes of the Trias, so that we see in this little creature probably a descendant of the earliest known form of mammalian life.

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spalacotherium and triconodon, and the singular plagiaulax, the first appearance of a rodent-like form of jaw; the front part being armed by a pair of powerful caniniform teeth with deeply embedded roots, behind which, and separated from them, are four curious obliquely grooved pre-molars and two small molars. From the Purbeck beds a great break occurs, and throughout the Cretaceous period we have no fossil forms of warm-blooded creatures, the small marsupials have entirely disappeared, owing to cretaceous rocks being of deep sea origin, the shore or land deposits not being at present recognised. When the shores of the great chalk period are discovered, many lost links in the chain of evolution will be brought to light. At present the record of land life is abruptly broken off at the end of the Purbeck beds, and only re-appears at the commencement of Eocene times. But the advent of the Tertiary age ushered in a very different life, and fossil forms have of late years been discovered in abundance to illustrate the fauna of this remarkable period.

From the Eocene beds in the Isle of Wight, from the quarries near Paris, from Switzerland and Greece, and from the Sewalik Hills in India, abundant materials have come to hand to furnish the zoologist with glimpses of its mammalian life.

The early Eocene was principally remarkable for the abundance and variety of ungulate life. These creatures were distinguished by possessing the archetypal number of teeth, viz., in $\frac{3-3}{3-3}$, can., $\frac{1-1}{1-1}$, p.m. $\frac{4-4}{4-4}$, m. $\frac{3-3}{3-3}$, or 44 in all. No tooth was raised above its fellow, there were no interspaces—characteristics possessed by man alone at the present day.

Many belonged to a group termed Anoplotheridæ, as the name denotes, "unarmed beasts," being destitute of protection in the shape of horns or teeth specialised as weapons of defence. This was probably due to the fact that, judging from fossil remains, there were probably few carnivorous beasts at the period whose attacks they had to fear, their principal enemies being the crocodiles and other reptiles which inhabited the marshes and river-banks. The molar teeth were tubercular or in crescentic ridges, anticipating the bunodont and selonodont patterns of the pig and ruminant types.

There were great varieties of forms; the anthracotherium was probably as large as an ox, with tubercular molars as the pig, and probably allied to the hippopotamus.

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Hippohyus and chæropotamus bore a strong resemblance to the peccary and hog.

Anoplotherium, an aquatic animal, bore a likeness in its dentition to pigs and ruminants.

Dichobune and dichodon were graceful forms, the former somewhat approaching the musk deer.

Palæotherium and paploplotherium bore resemblance to both the tapir and horse; but the latter, like the horse, lacked the first pre-molar in the adult dentition, giving evidence likewise of a slight diastema between the canine and the second pre-molar, which in the horse is so invaluable to man for the insertion of the bit.

Other singular creatures are represented by the gigantic coryphodon, with an enormous skull, but the brain so small as to be almost reptilian; the microtherium, an interesting dwarf ruminant the size of a rabbit.

Eocene animals then were principally ungulate, in almost all cases possessing the full dental formula 44; no tooth specialised, no diastema separating canines from pre-molars, but exhibiting a slight gradation in form from the front to the back of the mouth, possessing no protection in the shape of horns, and the brain case remarkably small.

Eocene mammals were continued into the lower Miocene strata, when numerous other types presented themselves, among others the graceful cainotherium, resembling the small musk deer, but with the full complement of teeth; the chalicotherium, which bore a resemblance to the anoplotherium, but as large as an Indian rhinoceros; palæochærus, considered to be the ancestor of the pig, to which, from its tubercular molars and large canines it was closely allied; indeed, from a little later formation the Miocene strata of Pikermi in Greece, skulls of an immense wild boar have been discovered by M. Gaudry, differing but little from those of the present day.

Schmidt declares that "the ancestral line of primæval pigs is evident enough for those who choose to follow it," and he traces it back in the following order: Middle Miocene sus, Lower Miocene palæochærus, Upper Eocene chærotherium.

Marsh states that the American peccary is probably derived from a different source—eohyus.

The Eocene palæotherium was succeeded by the anchitherium and hipparion in Miocene times, and finally by the primæval horse equus fossilis, in the third great epoch, the Pliocene.

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The illustration by Owen strikingly exemplifies the evolution in the hoofs and teeth of the horse from palæotherium through hipparion to horse. The three toes in palæotherium are reduced to two in hipparion, and lastly one in the horse, with the rudiments of two lateral toes remaining apparently as useless appendages to the central toe, and at the same time a corresponding reduction has taken place in the first pre-molar, producing the singular and abnormal wolf tooth in the horse, which is speedily suppressed, leaving the adult molar dentition represented by six teeth.

When the first Europeans landed in America there was no living representative of the horse, but geologists have discovered extensive remains of fossil forms, which had disappeared from the continent probably long prior to the advent of man.

Marsh, the great American naturalist, from extensive observations in Tertiary deposits in the United States, concludes that the American horse was probably developed from a different source from the old-world representative. The American deposits are rich in intermediate forms which are lacking in Europe.

Wallace, in treating on the geological evidence of the mammalia, illustrates very forcibly the descent of the American line of primæval horses by means of the changes in the toes and teeth, from the Eocene four-toed orohippus, probably the size of a fox, to the one-hoofed horse. The complication in the enamel ridges of the molar teeth are very striking, and we have now clearly demonstrated the process which has effected the formation of the complex grinding tooth with alternate arrangement of enamel, dentine and cementum, whose unevenness renders the surface of the crown of the sharpness of a millstone.

Within the last few months an older representative still than eohppus has been discovered rendering now the American line of horses complete.

The Miocene Age also produced the hyopotamus allied to the river hog, the hyotherium allied to the curious Indian babirussa, and a giraffe, whose teeth are almost identical in pattern with the Nubian representative of the present day. How very singular that this helpless ruminant has managed to survive through such an enormous period of time, while most of its contemporary mammals have been extinct for ages!

The deer family were represented by a musk deer—moschus aurelianensis—closely related to the African water chevrotain,

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hyomoschus aquaticus, which, unlike other ruminants, possessed canines in upper and lower jaws; also the dorcatherium, as large as a roe deer, but with the full complement of teeth and long tusk-like canines.

The change noticeable in the ungulate dentition of the Miocene period may be summarised as "a gradual extinction of the anoplotheroid type, the specialisation of certain teeth for weapons of offence or defence, as in the hog, musk deer, and dorcatherium, the diminishing of the first pre-molars and a consequent formation of diastemata, and a complication in the form of the molar teeth together with an increase in cranial capacity compared with creatures of the coryphodon type."

Professor Marsh states:—

"The real progress of mammalian life in America, from the beginning of the Tertiary to the present, is well illustrated by the brain-growth, in which we have the key to many other changes.

"The earliest known Tertiary mammals all had very small brains, and in some forms this organ was proportionally less than in certain reptiles. There was a gradual increase in the size of the brain during this period, and it is interesting to find that this growth was mainly confined to the cerebral hemispheres, or higher portion of the brain.

"In most groups of mammals the brain has become gradually more convoluted, and this increased in quality as well as quantity.

"In the long struggle for existence during Tertiary time the big brain won then as now; and the increasing power thus gained rendered useless many structures inherited from primitive ancestors, but no longer adapted to new conditions."

And these characteristics were continued through the later Pliocene and Pleistocene ages, resulting in the appearance of forms very similar to those now inhabiting the earth.

The dinotherium and mastodon, the mammoth which existed with prehistoric man, the hippopotamus, rhinoceros, various kinds of deer, ancestors of the ox—as bos antiquus and primogenius, buffalo and Irish elk—displaced the more lowly Pliocene forms.

Many have become extinct, some in comparatively recent times, as the Irish elk and mammoth; but the descendants of others still remain and bear evidence in their frames, and especially their dentition, of the gradual processes which have evolved the present specialised forms from their humble ancestors.

Let us briefly compare some of the familiar existing creatures

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with the ancestral type, and first we will take the sheep as a ruminant pattern into consideration.

We find in the upper jaw no incisor or canine teeth, but a dense pad of gum for the lower front teeth to close upon; the molar series are represented by six on the side of each jaw—three premolars and three molars.

In the front of the lower jaw six incisors and two incisor-like canines are present with a forward inclination of their crowns, and they are separated by a considerable space from the premolars —the first in both jaws being suppressed. Compare this with the ancient dichobune type, to which it bears a certain resemblance, but which possessed the full complement of forty-four teeth. These changes would probably be produced by the creatures which are timid and rapidly move from place to place in search of food acquiring the habit of tearing off grass and herbage, and hastily swallowing it, retire to a safe retreat for its subsequent mastication. This habit would bring about in time the diminution and subsequent suppression of the upper incisors and canine teeth —the collection of food being more readily and efficiently accomplished otherwise.

That this was the case, and that the present ruminant dentition is an evolutionised one, is evident from the fact that in the jaws of fœtal calves the germs of upper incisors and canines are frequently present, but are never calcified. Fortunately we have transitional forms.

Darwin tells us that the young males of antelope montana possess upper canines, but they are lost before adult life, while the hornless musk deer possesses powerfully canine teeth for protection, and the camel and llama not only have canines, but the outer pair of incisors, which are long and of caniniform shape as weapons of defence.

It appears to be a rule in nature that ruminants have either horns for their protection; or in place of them canine, or as in the llama, canine and incisor teeth specialised as fighting weapons.

Remains of the camel have been found at Pikermi, in Greece, in Miocene deposits with those of creatures which have ceased to exist for many ages. Who can doubt but that the possession of canine teeth has had something to do with the preservation of an apparently helpless form?

The horse when fighting bites with its incisor teeth, as it cannot possibly distend its mouth widely; but travellers tells us that the

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camel when enraged rushes furiously with its mouth wide open, and can then inflict terrible wounds with its canine teeth.

Evidence of its more numerous dentition are, like the calf, afforded in the fœtal state, where the germs of the missing incisors are present.

In a short paper like the present it is only possible to glance at a few species, and the forms I have taken will, I trust, indicate the lines of tooth suppression and specialisation from the parent ruminant type.

The later Eocene, and more especially the Miocene, produced a variety of carnivorous forms, which preyed upon the herds of helpless ungulates.

The origin of the carnivorous type must be sought for in ages antecedent to the Eocene; in the words of Schmidt, "we shall have to search for it in that dim twilight which, in the opinion of Cuvier and his followers, could alone precede the dawn of true light in the mammal world."

We have seen that various insectivorous marsupial animals existed so far back as the Trias, and we have evidence that Australia, which was probably separated and isolated in triassic times, has produced from marsupial origin creatures which closely resemble the carnivorous, rodent, insectivorous, and other dentitions characteristic of the mammals, and it is in this direction that Professor Huxley thinks we must seek for the origin of the carnivora.

In the Cretaceous period, representing a deep sea formation, these marsupial forms must have existed and evolutionised in some remote land, for we subsequently find evidence of their fossil remains in the later Eocene of the Paris quartres, as contemporaries of the lowly mammals then existing.

That the carnivora were produced from an insectivorous pattern is rendered probable by studying the dentition of the singular dog-like otocyon, the spoon dog of South Africa, which, unlike the ordinary carnivora, possesses four molar teeth on the side of each jaw, bristling with cusps. Professor Huxley regards this as the least differentiated, or most primitive existing form of canis, regarding the presence of the four molar teeth as a survival of the condition exhibited by the common ancestors of the Canidæ, and the existing carnivorous mammals.

One of the earliest carnivorous mammals is represented in the Eocene by arctocyon, a creature somewhat resembling a bear,

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but with tubercular molars like the pig, and with the low form of brain denoting its marsupial origin.

But the Later Eocene presented a wealth of carnivorous forms, for Filhol has discovered in the south of France alone some forty species, representing creatures from the size of a marten to a bear. Their remains, according to Schmidt, have been discovered in vast quantities, proving their immense numbers.

The viverrine dog cynodictis possessed the dental formula, in $\frac{3}{3}$, c. $\frac{1}{1}$, p.m. $\frac{4}{4}$, m. $\frac{2}{3}$, agreeing in its dentition with the dog, and probably the size of a wolf, but the character of the teeth bears close affinity to the civets.

The Felidæ or cat family are the most specialised of the carnivora in respect to their dentition at the present day, and are typical of true flesh eaters, their teeth being truly sectorial in character, the closure of the jaws effecting a slicing movement like a pair of scissors.

The dental formula is represented by in. $\frac{3}{3}$, c. $\frac{1}{1}$, p.m. $\frac{3}{2}$, m. $\frac{1}{1}$, or 30, showing a reduction of fourteen teeth.

In the upper jaw the first premolar is suppressed, the second functionless, the work of mastication being performed by the third and fourth in the lower jaw, the first and second pre-molars are suppressed, the third and fourth remaining, while the molar series is reduced to one in each jaw.

Let us contrast this highly-developed and limited dentition with some of the feline forms of the old Tertiary life, and we shall find the links in the chain leading up to the parent type from which the cat groups have been evolved.

In Miocene times pseudæturus possessed the dentition of felis with an additional pre-molar in the lower jaw, and archælurus from the American Miocene, considered to have been of the size of a panther, possessed four pre-molars and a tubercular molar in the upper jaw, and three pre-molars and two molars in the lower.

In the Canidæ or dog family we have presented a more generalised form, indicative of their omnivorous diet, and they agree with the archetypal formula in number in the lower jaw, but in the upper the third pair of molars is missing. The Miocene amphicyon had the full dentition of forty-four—the missing third upper pair of molars being present, and the teeth closely resemble in pattern those of the dog, only they are of greater dimensions, the second and third upper molar being especially much larger in proportion.

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In a paper I contributed last year to the Birmingham Philosophical Society I stated, as the result of an examination of a large number of dogs' skulls with my colleague, Professor Windle, we found one and sometimes both the missing upper molars present, either erupted, or sometimes retained in their crypts, pointing distinctly to its ancient ancestral type.

The work of evolution is further diminishing the number of teeth in certain breeds of dogs, for in the pug and the dacshund the shortening of the lower jaws is causing the suppression of the anterior pre-molar, which is prevented developing by the close proximity of the large canine, while the hinder pair of molars are often suppressed, leaving the dentition analogous to the icticyon or Brazilian bush dog.

The Insectivora and Rodentia appeared in early Tertiary times in great numbers, and the American naturalists, Marsh and Cope, from the prolific Eocene deposits of Wyoming have brought to light numbers of primitive mammalian forms, which have greatly assisted in the elucidation of the more specialised modern dentitions.

With regard to the origin of the Rodentia we know that the rodent type has been produced from three widely different origins: that Australia possesses its rodent marsupial, the wombat; Madagascar its lemurine form of aye aye, while the various mammals have been developed from a distinct source. Professor Cope, in his paper on the "Origin of the Rodentia," attempts to show from fossil forms in the Wyoming Eocene, that reduction in the incisor region was gradually produced by the reduction in size and final suppression of two pairs, leaving a highly differentiated pair remaining.

The lower jaws of calamadon and esthonyx show the three pairs of incisors present—the first being small, almost rudimentary; the second large and specialised, and the third minute.

Tiliotherium exhibits a further reduction—the first pair rudimentary, the second large, and the third suppressed; so that he assumes that the lower incisors of rodents are the second pair, the first and third being suppressed.

New light is constantly being thrown upon this subject by the researches of geologists in all parts of the world; the missing links in the chain of natural development are being yearly brought together.

Just a few words regarding man. Those of us who believe in

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his development through natural selection regard the occurrence of supplemental incisors and supernumerary teeth in the incisor region as evidence of his lower mammalian origin, for his teeth in number and shape bear a close resemblance to those of anthropoid apes, differing more particularly in the smaller size of the canines; which would be accounted for by the fact that man no longer requires canine teeth for weapons of offence or defence, nor for tearing his prey, as the discovery of fire has enabled him to cook his food, thereby diminishing the necessity for tearing and grinding it, as the apes with canine and molar teeth; while the development of his brain has taught him to manufacture efficient fighting weapons; but even now the lower races, as the Melanian, evince traces of their lower origin in the highly conical shape of the canines. Ape-like forms appeared very early in Tertiary times—the Miocene furnishing the Hylobates antiquus very closely resembling the Asiatic siamang of the present day, and also a species of dryopithecus, stated by Mr. Lartet to have approached man in its dentition more than the existing apes.

Beyond that period have been found by Filhol a lemur—the necrolemur antiquus—and a creature still more degraded—the cebo-chærus or hog ape, whose tuberculated molars declare its omnivorous diet.

There are a few instances of early specialisation, which appear at first sight more complete than presented by any animal at the present day, as evidenced by the extraordinary machairodus, the sabre-toothed tiger of Miocene times, where the suppression of molars was more reduced than the tiger or cat, the formula being represented by in $\frac{3}{3}$, c. $\frac{1}{1}$, p. m. $\frac{3}{2}$, m. $\frac{0}{1}$, and the upper pair of canines were so enormously developed as to project far below the lower jaw, rendering it difficult apparently for the creature to open its mouth, for which reason it probably died out as a species. It was at best but a clumsy beast, and could not compare with its modern representative, the tiger, with its large brain and perfected dental apparatus.

Two great forces are at work in nature, and have been so from the foundation of the world—one of progression and the other of retrogression. We see it evidenced by the teeth quite as much as any other part of the animal mechanism.

From early Eocene times the increased cranial capacity has been accompanied by the suppression of certain teeth, and the perfecting of others to suit the animal's altered mode of life; while in other

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cases, from causes but imperfectly known, a corresponding degradation has taken place, as in the ornithorhyncus and whale.

WORKS CONSULTED.

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"Characteristics of the Canidæ," HUXLEY.

"Proceedings of the Zoological Society," 1880.

On Working Vulcanite.

BY J. H. REINHARDT, L.D.S.I.

FINDING great diversity of opinion about the amount of heat of steam pressure, and time necessary to produce the best results in vulcanising, I began a series of experiments to try and determine both points.

Professor Wildman, in his "Instructions in Vulcanite," on page 26, gives a table of the correlation between steam pressure in pounds and degrees of heat (Fahrenheit); another table, the result of Dr. Lawrence's experiments, is given on page 364 of Richardson's "Mechanical Dentistry;" a third is marked on Gartrell's gauge, neither one agreeing with the other two.

The vulcaniser used in the following experiments is fitted with both steam-gauge and thermometer, and as the latter registered a different heat to the above quoted tables, it was thought to be

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incorrect and another obtained; the result was still different. The steam-gauge was then suspected, so it was changed without affecting the result; altogether *six* thermometers were tried (all differing from 3° to 18°); ultimately, not being able to get one made which would be verified at Kew, one was used which registered about midway between the highest and lowest; it must, therefore, be borne in mind that in the accompanying tables the degrees of heat (Fahrenheit) are only *approximate.*

The vulcaniser used was Ash's 3-flask portable vulcaniser, fitted with Gartrell's steam-gauge and regulator, thermometer and steam tap.

The first series of experiments to determine the relation between steam pressure and heat was without flasks; varying quantities of water were used in the effort to get a thermometer to register the same heat as in any one of the tables above mentioned, and resulted as follows, viz.:

No. 1. Without Flasks.

Pounds pressure.	Degrees Fahrenheit.							
	⅛ Pint of Water.		¼ Pint of Water.		½ Pint of Water.		1 Pint of Water.	
	* Starting cold.	† Blowing off steam.	Starting cold.	Blowing off steam.	Starting cold.	Blowing off steam.	Starting cold.	Blowing off steam.
20	200?	247	217	247	208	247	227	245
30	232	262	240	261	232	262	234	259
40	255	273	250	272	252	273	243	270
50	267	282	263	283	267	282	256	281
60	278	291	273	290	277	290	267	290
70	286	297	282	299	286	297	276	296
80	295	304	291	305	295	304	285	304
90	301	311	299	312	300	310	292	309
100	308	317	305	317	308	315	300	314
110	314	322	311	322	314	321	305	322
120	320	327	317	329	320	327	310	327

* Closing vulcaniser while cold.
† Leaving steam-tap open until thermometer registered 212°.

The above table shows that great variation in the registration of heat occurs when "starting cold," probably due to the expansion of confined air, while "blowing off steam" gives a fairly even temperature for all quantities of water. As, in practice, it is unusual to use more than a quarter of a pint of water, the next experiments were made using first, one-eighth, and then a quarter of a

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pint, with one, two, and three flasks; as the results were identical but one table is given.

No. 2. Using ⅛ or ¼ Pint of Water.

Pounds pressure.	Degrees Fahrenheit.					
	Starting Cold.			Blowing off Steam.		
	1 Flask.	2 Flasks.	3 Flasks.	1 Flask.	2 Flasks.	3 Flasks.
20	217	220	220	247	247	247
30	238	240	240	260	263	263
40	253	255	256	272	275	275
50	265	265	265	281	283	283
60	276	277	277	292	292	292
70	284	286	286	299	299	299
80	293	295	295	306	306	306
90	300	302	302	313	313	313
100	307	309	309	319	319	319
110	312	314	314	324	324	324
120	320	320	320	329	329	329

Another series of experiments was then begun, in order to determine the relative values of vulcanising in and out of water, and with and without the use of a "polishing plate"; for this purpose four pieces of brass were used, each measuring two and-a-half inches long, half an inch wide, and one-eighth of an inch thick; these were invested in plaster in flasks in pairs, *i.e.*, two in each flask, and one of each pair had a piece of tin foil burnished to it on one side; these brass blanks were replaced by rubber which was then vulcanised, using two flasks each time, and sufficient water to come about half-way to the top of the lower flask.

Different heats and varying periods were tried, beginning at 75lbs. pressure for an hour; the time of each subsequent vulcanising was increased fifteen minutes until two hours was reached; the same process was gone through at 80, 85, 90lbs., and so on up to 110lbs.

The strength of each piece of the resultant vulcanite was tested by fixing one end in a horizontal vice, and suspending weights to the free end two inches from the jaws of the vice; by means of a protractor the amount of bending which took place before the piece of vulcanite cracked or broke was noted. After eliminating the uncooked and very brittle vulcanite, the following table was left:—

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No. 3. Using ¼ Pint of Water and Two Flasks.

Vulcanised at		Weight in lbs. Necessary to Break Vulcanite, 2" × ½" × ⅛"					
		Lower Flask.		Upper Flask.		Angle of Fracture.	
Pounds pressure.	Time in hours.	In Plaster.	With polishing plate.	In Plaster.	With polishing plate.	In Plaster.	With polishing plate.
75	2	17	18	...	...	50	48
75	2	...	...	16	17	50	55
80	1½	14	17	...	...	43	53
80	1½	...	...	12	16	40	60
85	1¼	12	18	...	...	38	53
85	1¼	...	...	14	15	48	52
85	1½	12	16	...	...	49	45
85	1½	...	...	15	12	51	38
90	1	12	14	...	...	44	46
90	1	...	...	14	16	44	48
90	1¼	13	Defective.	...	...	40	
90	1¼	...	...	15	17	42	44
90	1½	15	18	...	...	45	52
90	1½	...	...	12	17	42	52
95	1	9	12	...	...	37	40
95	1	...	...	17	23	54	60
95	1¼	12	16	...	...	45	55
95	1¼	...	...	16	21	53	59
100	1	Defective.	Defective.	...	14	...	49
100	1¼	16	17	...	...	55	55
100	1¼	...	...	20	21	58	60
105	1	9	12	...	...	40	51
105	1	...	...	12	16	60	53
105	1¼	13	14	...	...	57	50
105	1¼	...	...	16	17	47	60
110	1	11	12	...	...	40	49
110	1	...	...	12	24	47	57
110	1¼	14	16	...	...	51	54
				15	12	49	48

According to the last table better vulcanite was produced (with few exceptions) in the upper flask and by using a polishing plate. These last experiments were made "starting cold," and, although it is believed that better vulcanite is produced by "blowing off steam," as the majority of dentists use the thermometer alone, it is not intended to make further experiments in that direction until a reliable thermometer can be obtained.

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Implantation of Teeth.*

By G. CUNNINGHAM, M.A.Cantab., L.D.S.Eng., D.M.D.Harv.

From the interest displayed at the last meeting of this Association in this subject of the implantation of teeth, I have little hesitation in bringing before you a further report thereon, even although it can only be of an interim nature, since an interval of some years is essential to the estimation of the practical value of these experimental observations on the human subject, and since the period of nine months, which has been at my disposal, has proved altogether too short for the completion of the experiments on dogs.

An increasing number of operators in America seem to have adopted the operation, while those whose names are associated with the earlier introduction of the operation continue to practise it with apparent success.

No specially new methods or important alterations in the operation seem to have been adopted, except further improvements in the instruments employed, the most notable of which are the reamers of Dr. Ottolengui, who has also contributed a very useful and complete study of the anatomical relations of the alveolar sockets especially with a view to this operation.

In my former paper I laid great stress upon the value of statistics, and it is certain that from the absence of such information, most of the literature on this subject, however interesting it may be, lacks the scientific value it might have had.

So far, I of course regard all such operations in the light of scientific experiments rather than operations of ascertained practical value, hence the absolute necessity of our endeavouring to ascertain something really definite with regard to the results of the operation.

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* It may be of advantage to remind our readers that a preliminary paper on this subject was read by Mr. Cunningham before the Annual Meeting of the Association in 1888, and was subsequently published in the Journal and Volume of Transactions.

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I feel it, however, necessary to utter a protest against the wretched and misleading statistical table published by the Chairman of the Section of Operative Dentistry, at the American Dental Association of last year. The absurdity of it is surely apparent from the use made of information I myself supplied, viz., seven cases of implanted teeth which had been in the mouth from a few days to seven months without a loss are tabulated as 100 per cent. of successes and 0 per cent. of failures, without any allusion whatever to the time the teeth had been *in situ*. Three other operators appear in this list with a similar per centage, without a clue being given as to the number, or the duration, of their individual cases. Some of the other entries seem equally misleading, and, therefore, nothing could be more erroneous than the conclusion of the report that the average success of the seventeen operators is correctly represented by 85 per cent. of successes to 15 per cent. of failures.

Similar returns being made this year, however, have been much more intelligibly framed, and should result in information of some scientific value.

Notes on my own Cases.

First series.

Before describing my more recent cases it will be better to follow up the subsequent history of the eight cases already presented to this Association.

Case I.—Enquiries have elicited no response.

Case II.—On the 25th March, 1889, the scion tooth implanted on the 29th Nov., 1887, that is after an interval of one year and four months, was found to be extremely loose, freely movable in anterior and posterior directions, but strongly resistant to downward traction. The patient reported that the tooth gave way with slight crepitation, and was pushed outwards by biting a "hard bread crust." This accident can only have hastened matters somewhat, as a fortnight previously he had noticed a fistulous opening on the gum, which, as he rightly remarked, was a sign that all was not going on quite right. On extraction the root was found to be considerably absorbed, while it seemed evident that for some time at least it had only been retained by the growth of

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the granulation tissue into the cavity of absorption. The former socket seemed to be filled up with a formation of new bone above the absorbed root; the lower border of the gum was red and somewhat inflamed. A dressing of cotton wool saturated with carbolized resin was inserted into the wound, as it was determined to try a second implantation. It was extremely difficult to find a suitable scion tooth for this case, so much so, that the first attempt was made with a rather badly decayed right lower canine, which, after pulp treatment and filling the crown with a porcelain inlay, was ground down to represent the shape of a lateral. After being placed in position it was so unsatisfactory that a honeycombed or pitted, but otherwise healthy lateral was substituted for it. The preparation of the second socket proved more difficult and tedious than the first. A 50 per cent. solution of cocaine hydrochlorate failed to diminish the pain of the operation to any appreciable extent. The tooth was fixed with a gold splint, only covering the tips of the teeth anteriorly, by means of a phosphate cement. During the night the splint came off, and when the patient presented himself next day the tooth was found to be quite loose. Having overcome the patient's objection to a splint which would show from the front, I proceeded to arrange a metal ribbon splint; while doing so the patient flinched and the tooth was left in my hands. I did not regret this so much, as even this second tooth was not satisfactory from the point of view of appearance, and I was obliged to resort to another which I noted at the time as "an emergency case." It was the left upper lateral incisor of a little boy of thirteen years of age, extracted nearly six months previously, and had been kept for 171 days in a one in two thousand solution of mercuric chloride. The pericementum was shreddy and detached, and on the distal surface presented a curious metallic-looking stain. The crown was largely disked in order to adapt it to its position on the right side. The socket was syringed with one in a thousand solution of mercuric chloride. The tooth fitted fairly tightly and was fixed by a German silver ribbon splint extending round the neighbouring adjoining teeth. The pulp, which was non-putrid, was removed when the tooth was *in situ*, the root canal and cavity on the palatal surface being filled in the usual way.

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On the 12th August, 1889, this second implantation was found to be not as rigid as the first, but still fairly firm and perfectly comfortable.

CASE III.—This case will be familiar as the one which was presented at Dublin last year. Soon after the meeting he had a severe attack of what was described as rheumatic fever, without rheumatic pains. He was delirious for three weeks, and had other complications, which laid him up for a very considerable time; in fact, it was quite six months before he could be called fairly convalescent. The patient again kindly presents himself for examination. You will have no hesitation in endorsing the patient's statement, that the scion tooth is "perfectly firm and unshaken, and the gum quite healthy."

CASE IV.—On August 9th, 1889, the patient writes to say that the tooth implanted on the 4th February, 1888, is going on very satisfactorily.

CASE V. will be remembered as that of J. H. G., a barrister, in whose case the antrum was perforated in the preparation of the artificial socket. The scion tooth, after becoming absolutely firm and rigid, somewhat suddenly became loose, and was lost just about a year subsequent to the implantation, which more than justified Mr. Baldwin's pessimistic view of the situation.

With regard to the fistulous tract in the molar region, which Mr. Baldwin considered led from the antrum, and which I thought was rather ascribable to the death of the pulp in one of the molars, although no sufficiently carious cavity was apparent, it seems rather to have been caused by the latter condition, since he has been compelled to drill into the molar and remove the dead pulp.

CASE VI.—T. S. G. Enquiries have elicited no response.

CASE VII.—The patient writes, August 15th, 1887: "Tooth very firm."

CASE VIII. was remarkable in my report of last year from my having noted it as being probably a failure. The patient, from the urgency of his duties in a large and important public school, was unable to present himself for examination until the Christmas vacation. On January 2nd, 1889, the patient reported that he had worn the splint for about six weeks, or possibly longer, after the operation, but on removal

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he found that the tooth was quite loose. He had had, however, absolutely no pain or trouble with it. The tooth was found to be extremely loose; the labial surface of the gum over it and the adjoining teeth were in a chronic state of inflammation; on the palatal surface the tissues were so absorbed as to expose a portion of the root of the scion tooth, but the gum seemed quite healthy in appearance. This surface was quite clean, while the labial surface was covered with food débris, the patient being afraid to brush it in consequence of its looseness. The tooth could be moved up and down in the socket, but was so retained that it could not be pulled out with the fingers, showing that there was a distinct attachment of some sort. The lateral movement was very considerable, and by holding the crown one seemed to be able to move the apex of the tooth very slightly. The gum was detached for some way all round the root, but no signs of pus formation were observable. The articulation was such that on each closure of the mouth the tooth made a considerable excursion upwards and forwards. My own inclination was to remove the tooth at once, but the patient preferred giving it a longer trial; the articulation was therefore eased, and a new gold wire splint applied. The inflamed gum was treated with resorcin and tincture of iodine. In the course of the third week the splint, from the thinness of the rings, broke, and on his presenting himself in the Easter vacation the patient accepted my decision as final, and the tooth was removed.

The patient was quite willing to try the operation once more, but since I ascribe the failure in this instance as partly due to the already greatly absorbed condition of the alveolus I deemed it futile to make any further attempt in that direction, and succeeded in remedying the defect by the application of a porcelain crown attached to the second bicuspid.

It will be remembered in this case also that there was a perforation of the antrum. Examination after the removal of the implanted tooth showed a complete closure of the perforation by the formation of new bone. The accident therefore gave rise to no trouble beyond that mentioned in my previous report.

Summary of Cases (First Series).

In all eight cases, with eight implantations; four of these are reported as doing well (August 1889), two have not replied

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to enquiries made, while two are failures. Of these two failures one was never promising and never got firm, while the other was exceedingly firm for nearly one year.

Second Series.

I shall now ask you to consider the cases which have been operated during the present year, some of which, even when extremely unsatisfactory from the patient's point of view, I think do something, if only in a negative way, to establish a knowledge of some of the details essential to success.

A careful consideration of the literature on replantation and transplantation of teeth seems to prove that there is a possibility of a re-establishment of the vitality of the pulp in both replanted and transplanted teeth. As some practitioners are, not unnaturally, sceptical as to this possibility, I shall present for your consideration short quotations from two authors, both eminent scientific men belonging to our Association, and in the accuracy of whose observations I am sure you may place implicit trust. The able editor of our Journal, in his interesting little book "Aids to Dental Surgery," says:—

"All analogy would seem to be in favour of the probability of re-union and re-establishment of vitality in the pulp, and only an unaccountable prejudice seems to range itself on the other side. In addition to these theoretical grounds I have practical reasons for believing in the phenomenon. On two occasions recently I have extracted incisor teeth, and replaced them immediately in an altered position. The teeth became rapidly firm and comfortable, and in a day or so were free from tenderness. After three years they retain their natural colour, though, the patients being children and the injury sudden, death of the pulp might fairly be supposed to have entailed discolouration. Their sensibility to warm instruments was as great as that of their neighbours. A powerful lamp, which rendered the teeth transparent, and readily showed a dark pulp chamber in other dead teeth, showed the usual pink appearance in the teeth in question. Every experiment we could devise pointed to the fact that the teeth were alive, and I firmly believe they were so."

Professor Stack, in his masterly paper on "Replantation and Transplantation of Teeth" claims for Mr. Arthur Baker, Mr. Abraham and himself, the honour of actually demonstrat-

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ing that the union of the pulp vessels and nerves with their trunks can take place in such teeth after removal.

"In a case of great irregularity where two bicuspids had to be removed. . . . . I was permitted to transpose the teeth under nitrous oxide. The teeth fitted into the new sockets nicely, but after a fortnight the tooth which had been transplanted into the right socket was attacked with alveolar abscess. It had apparently got all right after the operation, but I suppose putrefaction of the pulp had then set in, resulting in the necessity of removing the tooth. The other tooth united firmly, however, and kept a good colour. After two months I determined to remove it, but before I did so I drilled in cautiously through the crown; after each few revolutions I asked if I gave any pain, but I found I gave none, nor did I give any when the drill entered the surface of the pulp, but there was bleeding from the wounded organ. The tooth was then removed and handed to Mr. Abraham for microscopic examination (*vide* Figures 1 and 2). In other cases that have come under Mr. Baker's and my notice, where the tooth had ultimately to be removed for irregularity, was replanted for a short period, and microscopic examination has shown evidence of vitality in the pulp. In all six teeth have been examined in this way, in four of which we found signs of life, while in two, namely, one that has been already mentioned and another, we found bacteria and other evidence of putrefaction."

Although it is not certain that direct reunion of the pulp has occurred in these cases, but only an ingrowth of new granulation tissue, such evidence alone seems to justify my endeavour to ascertain whether it was absolutely essential to eradicate the pulp of the scion tooth in the analogous case of implanted teeth. Although in such cases my fear was that it would be futile, I deemed it better to establish the fact by actual experiment. I, therefore, determined to adopt it should a favourable opportunity occur, always recognising that the shorter the interval between extraction and implantation the better would be the prospect of union. Another motive which impelled me to attempt what some may deem an utterly hopeless experiment was the fact that thereby one would remove what is an undoubted disadvantage, viz., the injury more or less great which must ensue to the periosteum when the tooth

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is prepared and filled out of the mouth, while, moreover, I thought that by carefully watching such teeth one might be able to mark the degeneration of the pulp from external experiences, and, by its then removal, prevent the deleterious consequences that might be anticipated therefrom extending to the area beyond the apex.

With these views, and under the stress of exceptional circumstances, I endeavoured to determine this point in the following case.

Case IX. will be familiar to some of you, since it formed the subject of my clinic on this operation at the Dublin meeting. The patient, R. E. T., was a healthy young dentist, aged twenty-four, who had lost the right upper first bicuspid some years previously. The gum was healthy, absorption of the alveolus complete, and the condition of the operating field seemed entirely favourable. The scion tooth (a left upper first bicuspid) was extracted from the mouth of a healthy young girl aged sixteen, and was out of the mouth only about three-quarters of an hour, during which time it was kept in a one in one-thousand solution of mercuric chloride. Owing to the circumstances, I neglected to make my usual notes on the condition of the periosteum, but my impression is that while the root seemed only partially covered with periosteum it was not, as far as my experience went, at all an unfavourable case for implantation. In adjusting a metal ribbon splint of the usual kind with phosphate cement, I found to my dismay that the latter did not seem to set properly. It was a fresh packet of Weston's cement furnished direct from one of the exhibitors, and I therefore thought it might only be extremely slow setting and that it was better to let the partially set mass remain, thinking that all it wanted was time to complete the process. The cement, however, never thoroughly set, and within two days the splint came away.

I have been unable to get the exact details of the subsequent history of this case, but the gist of it is as follows:—The case was more or less troublesome from the first. The tooth was never firm. In October my brother removed the pulp, and filled the root canal. In December the patient removed the tooth himself. The roots were much absorbed.

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Case X. was that of a young Cambridge graduate, A. T., aged twenty-three, of excellent physique and extraordinarily good health, despite the fact that his teeth and gums were in a simply deplorable condition, but after an extensive series of conservative operations upon other teeth it was found that four of those in the upper jaw were so bad as to necessitate radical treatment in the shape of extraction. There were two fistulous openings, one over the right upper lateral incisor and the other over the left upper bicuspid, while of both the first molars only the remnants of the three separate roots remained. The aspect of the gums was of dull purple colour, with swollen inter-dental papillæ, in fact, that chronic gingivitis which is so characteristic of a long-neglected mouth. The case was certainly not a favourable one, but it was determined to make the experiment of implantation there and then, because the operations would be less severe if performed at that time than if they were postponed until the parts had completely healed. On August 30th the remains of these four teeth were removed. On September 1st the sockets of the right upper lateral and the left upper bicuspid were enlarged and widened in their whole extent. The scion tooth for the incisor space was the right upper lateral incisor of a healthy young woman, aged nineteen. The pulp was removed and the root canal filled with zinc oxychloride, and the two carious cavities in the crown filled with gold. With regard to the condition of the periosteum the upper part was very bare and the entire root very much stripped. Every care, however, was taken with these remnants of the periosteum by retaining the scion tooth during the treatment in the holder which I described last year. The interval of time which elapsed between its being extracted and implanted was exactly twenty-five hours, during which time it was retained in the usual solution of mercuric chloride, 1 in 2000. It was secured in position by means of a metal ribbon splint and phosphate cement.

The scion tooth for the bicuspid space was taken from a healthy young patient, aged thirteen, and was prepared in the same way and with the same care as the other tooth, but owing to the apices of the root being still patent the instrument and the filling material passed through the foramina. There was much more periosteum on this tooth than the

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other, but only in patches, while the greater part of both the labial and distal surfaces were completely stripped. In this case four days elapsed between extraction and implantation of the scion tooth, during which time it was kept in the usual solution. On completion of the operation it fitted so firmly between its two neighbours that no splint or ligature was deemed necessary. An idea of the unsatisfactory condition of the operating field in this case may be gathered from the fact that on the same day I was obliged to make a series of small scissor incisions in flaps of the gum with a view of inducing it to grow over the alveolar border which was completely exposed in several instances in the inter-dental spaces. On September 3rd the sockets of the molars were prepared for the scion teeth. These both came from a healthy young girl, aged fifteen, and as the time between extraction and implantation was of the very briefest and the teeth for all practical purposes sound and perfect, the pulps were not removed. The periosteum, however, seemed to have been almost entirely stripped off in the process of extraction, with the exception of a fair investment at the apices of the roots. The interval between extraction and implantation was twelve minutes in the case of the left molar and twenty minutes in the case of the right. Both teeth fitted so tightly that no splints were applied. The patient left Cambridge two days afterwards, and reported that the case seemed to be going on fairly well. About September 13th the teeth became somewhat displaced and the patient wrote asking for a splint to be sent. I was then away on my holiday and the assistant sent him a splint with instructions for its application. On September 15th the patient wrote:—"I tried to follow your instructions but only succeeded in making the teeth much looser, therefore went to a Bradford dentist and let him try—same result, that is, teeth much looser still, in fact, I thought myself more successful than he. . . That they stood all this pulling about makes me believe they would have held if I had left them alone, but now they are so very loose that it hardly seems safe to leave them unfastened."

On his return to Cambridge on the 16th the teeth were found to be loose, those on the left side particularly so, and pressure of the gum on the labial surface caused a considerable amount of pus to flow from both molars; similar pressure

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on the palatal surface betrayed no existence of pus formation. The wire splints having been re-shaped they were applied, and the teeth fastened with thin wire. The mouth had not been kept so clean as it might have been, and extra urgent advice was given him on that point. Towards the beginning of November the thin binding wire seems to have led to considerable swelling of the gums, which promptly yielded to an arnica and chlorate of potash wash.

On November 18th the patient writes that "Either the bone or the root of the molar on the left side appears through a small hole in the gum so that I can touch it." It was not, however, until January 11th that he was able to return to Cambridge, the dental alloy splint being still in position. I noted the condition of the parts four months after the operation as follows: the right upper lateral incisor and first molar fairly firm in splint, left upper bicuspid and molar loose and evidently doomed; much food débris and other deposits on the left side, the right side in better condition. On removal of the splint the lateral seemed fairly firm, the right molar less so. The gum was noted as being in fairly healthy condition for a normally purple gum; the left upper bicuspid was quite loose and the gum deeply congested. The tooth could be made to make a considerable excursion both in labial and palatal directions, but on traction with the fingers would not come out. It rose and descended in the socket as the patient opened and closed his jaw. The molar was even in a worse condition, the buccal roots were quite exposed and the gum and the alveolar plate seemed quite gone, the surface being thick with putrefactive débris. The excursion of the tooth laterally seemed quite unlimited; there was, however, resistance to downward traction. This, however, seemed entirely due to attachment on the palatal root which however was only apical. The molar was then removed with the fingers; it looked and smelt like what it was—viz., a badly necrosed tooth, with a merest attachment at the end of the palatal root. It was decided to give the right molar every chance, and although not very promising the crown was drilled into, the pulp removed, the root and crown being treated in the usual way. From the pus, however, which exuded from the border of the gum it was evident that it was following very much the same course as its fellow on the other side.

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On April 29th, about seven months after the operation, I had another opportunity of examining the case, when the general condition of the mouth was noted as badly inflamed, with bright raw patches on the labial surface of the gum. The right upper lateral incisor was loose and could be made to make a considerable excursion forward, when it was evident that there was no attachment of the gum on the palatal surface, though the gum there was pink and healthy. There was no dropping of the tooth, nor could it be forced upwards, thus indicating considerable apical attachment; labially there was a fistulous opening with a discharge of pus. On examination I could find no signs of bone on the labial surface of the root, only a thin covering of the gum with considerable absorption in the neighbourhood of the fistula. Both the central incisors, which were pulpless, having also been treated in August, 1888, were also rather loose, and on enquiry I found there was a history of rather a severe blow at football which occurred in February, 1889. The left upper molar showed considerable freedom of movement in labial and palatal direction on pressure, while pus was escaping from the labial margin of the gum. I noted at the time that it seemed as though the absorption of the alveolar border which usually occurs after extraction had gone on in spite of the implantation. The gums had receded and were for him of a fairly healthy colour; the roots of the implanted teeth were largely exposed and looked as if necrosed. The left upper bicuspid was in a hopeless condition, moving freely in all directions; it was therefore removed. An effort was made to improve the conditions of the two teeth on the right side, but unsuccessfully, for on the patient again presenting himself on August 7th, 1889, the molar was found to be in a hopeless condition with pus exuding from the margin of the gum, it was therefore extracted and found to be quite necrosed. The lateral incisor was loose, but without the slightest sign of any pus formation; there was great absorption on the labial and lingual aspects, the gum even to the very edge seemed what we would call normal for this mouth. It was quite resistant to downward traction, and required some considerable force to extract it. The parts rapidly healed and two partial bridges, one of them removable, have been adjusted to fill up the space.

In this case failure has been complete and absolute, and

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the question may be well asked: Was it worth trying? I thought the patient would be a better judge of that, for I must candidly admit that had my sole desire been to achieve a high per centage of successes I should never have attempted this case. The following is a spontaneous and untouched record of the patient's impressions after failure:—

"Having had four teeth implanted I have often been asked what my impressions of the operation were. Though in my case it was a failure, I do not regret the experiment, although I cannot help being disappointed at its want of success. I have already written some notes on the pain of the operation, and whilst it was still fresh in my mind, and so these are of a more general nature.

"I had the case put before me honestly from the start by Dr. Cunningham; it was an 'experiment' which had succeeded for others—might succeed for me—and quite possibly might fail, more especially as the conditions were less favourable than usual. I was also given a very good idea of the nature of the operation. If it were a success the advantages were so obvious that I was quite willing to undergo the experiment. After the first two implantations I could not help remarking: 'Well, it is not so bad after all'—and when all four were finished, I considered that as far as pain was concerned it was worth undergoing, if the teeth would stop in for six months. One was in for five months, one for eight, and the other two for a year, and though they were never very firm these last two certainly did a very fair share of useful work.

"After the operation I never had the least trouble with the teeth—no pain and no inconvenience in talking or in any other way, and so little extra precaution did I take for them that I played football, with all its risks, and with perhaps as much recklessness and as many little mishaps as seem usual to me.

"So after a good experience I cannot see anything to be afraid of in this new process. It does not strike me as worse than some other more ordinary dental operations. I am sure I suffered more pain in the drilling and stopping of one particularly decayed tooth than in any of the implantations; and I have a much stronger objection to the two or three hours' pain caused by copper sulphate treatment of the gums than

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to the much shorter, if severer, pain of implantation. A day's severe toothache is a thing to be dreaded in comparison to the operation.

"Finally, I cannot but think the chances of success in my case were seriously diminished because I could only see Dr. Cunningham at intervals of four months, and in the meantime had no opportunities of getting other expert advice.

"*August 17th*, 1889. A. T."

CASE XI. was that of A. E. M., a medical student, aged nineteen, whose teeth were in an excellent condition but for the remains of two small roots of the left lower first molar. On November 13th, 1888, these were extracted, the two cavities furnishing a guide for the direction of the new sockets, which were enlarged there and then. The gum was healthy, and the condition of the operating field thoroughly satisfactory. The scion tooth was one which had been extracted on the previous day by Mr. Baldwin for the relief of an irregularity. It was sound and healthy, and had been kept in the usual solution ($Hg. Cl_2$ 1 in 2000), although the greater part of the roots were covered with periosteum, one or two places were stripped quite bare, notably the entire lingual surface of both roots. The operation proved fairly simple, and was so well adjusted to the shape of the scion tooth that the support of neither splint nor ligature was deemed necessary. No further treatment was necessary, the parts quickly healed, and on examination of the case, on May 22nd, 1889, I found the gum healthy and well attached, but the roots exposed as far as the bifurcation on the lingual side. The tooth was then quite firm, and had given rise to no trouble.

On August 16th, 1889, the patient wrote that the scion tooth was very firm and freely used.

CASE XII. was interesting, if only from the fact that the past history of the tooth replaced proved that there are other dental operations which sometimes result in as rapid failure and in as serious results as that of implantation. This patient, B. B. H., a healthy undergraduate, then aged twenty and a-half years, had had the carious crown of the left upper lateral incisor excised and a pivot tooth adjusted on the root in February, 1887, by a London practitioner. In November, 1888, I found that the tooth was loose and carious, and had given rise to a chronic abscess, with considerable swelling on

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the palate. After extraction of the root, probing demonstrated the existence of a very considerable cavity in the bone, at the apex of the root, and arching towards the palate. The socket was dressed with styptic colloid until the following day (Nov. 17th, 1888), when it was enlarged and burred in its fullest extent. The scion tooth was that of a healthy undergraduate, aged seventeen, but from a twist in the root it was considerably stripped of its periosteum in extraction. The mesial surface was almost bare, while only patches were visible on two-thirds of the labial and on one-third of the distal surfaces. No special preparation was made, nor were any special antiseptic precautions taken, beyond those of scrupulous cleanliness. Half an hour elapsed between extraction and implantation. It was fixed with a ribbon metal splint and phosphate cement. In about a fortnight (sixteen days) the splint was removed and the tooth disked to a more suitable shape. It was then fairly firm and all signs of the abscess had disappeared. I have not seen the case since, but on August 8th, 1889, the patient writes that it is as firm as any of his other teeth.

Case XIII. was that of P. W., aged nineteen, a healthy young dental assistant. Some five or six years previously he had his upper centrals severely fractured, and after some ineffectual pulp treatment, the roots finally removed. Evidently the small partial denture he was then wearing had not been inserted for some time subsequent to these extractions, since the space between the laterals was considerably contracted. The gum was quite healthy and the condition of the operating field thoroughly satisfactory, except for the fact that the alveolar process was extremely thin, principally from absorption anteriorly. Notwithstanding the fact that he had assisted at most of these implantations, he was extremely desirous of undergoing the operation in his turn. We had long been on the look-out for two suitable teeth when one afternoon, just as I was on the eve of leaving for London, my colleague, Mr. Jones, brought in two upper lateral incisors, which very nearly filled up the intervening space between the patient's own lateral incisors. The scion teeth were extracted from the mouth of a healthy boy, aged twelve, on Dec. 8th, 1888, at three o'clock. Within twenty minutes of our decision that these teeth would suit the case, and within one hour of

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the extraction the two artificial sockets had been made and the two teeth successfully implanted therein. The teeth were ligated with silk, and the wound healed fairly firm and rapidly. The pulps of the teeth had not been removed, which did not prevent the teeth in a short time becoming firm without any change of colour. About two months afterwards the teeth began to loosen, and on February 11th, 1889, examination showed that the right upper central was extremely loose, while a fistulous opening had formed on the median palatal ruga. This fistulous opening was evidently caused by this incisor, as the crown could be distinctly moved by pressure with a stiff probe through the fistula. The left upper central incisor was looser than formerly, yet still relatively firm. After adjusting the rubber dam, the pulp cavities in both teeth were opened. The lower parts of the pulp seemed to have undergone a kind of liquid degeneration, while the upper parts, from their bloody condition, afforded evidence of the vascularity of the pulp. There were only slight traces of putridity.

There was absolutely no trace of sensibility in the pulps. After their removal the roots were treated in the usual way, syringed with one per cent. solution of mercuric chloride, filled with zinc oxychloride, and the crowns with phosphate cement. No distinct discolouration of the dentine was visible. During this operation the right upper central suddenly turned with the drill, showing that the attachment had been broken, and on pressure the tooth made a considerable excursion upwards. After removal of the rubber dam, I found I could remove it quite easily with the fingers. The upper half of the root was absorbed to a considerable extent, while the lower half was smooth and seemed devoid of a pericementum. The socket was syringed out with a one per cent. solution of mercuric chloride, also with peroxide of hydrogen (10 vol.). The tooth was then replaced and secured by means of waxed silk ligatures. In a few days the teeth were much firmer, but have never yet become so firm as they formerly were. The patient reported (July 24th, 1889) to my brother that they are still in position.

Case XIV. is somewhat peculiar. It was that of O. P., a young, healthy Cambridge graduate, aged twenty-two. He had consulted me specially about an extreme and disfiguring

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irregularity of his front teeth. He objected entirely to any method of regulation which would entail the wearing of plates for any length of time. The deformity in the upper jaw was treated by luxation. We determined to treat the deformity in the lower jaw by the extraction of the left lower canine and the forcible luxation of the left lower central. In consequence of the canine being entirely out of the arch, and the crowded position of the lateral and first bicuspid, it was impossible to apply the forceps in the usual way. After some difficulty it was, however, successfully removed. Then, in endeavouring to luxate the lateral into position, it suddenly "leapt" out under the pressure of the forceps. The tooth was placed nearly at right angles from its normal axis, and on examination it was found that the root was unusually long, tapering and twisted. It was then deemed better to drill out the inter-alveolar septum in order to form a socket for the tooth which seemed best adapted to the situation. This proved to be not the lateral, but the canine. In consequence of the great length of the root the process was extremely tedious, difficult, as well as very painful to an extremely nervous patient. In a part of the operation the patient caused the instrument to swerve, which resulted in a perforation of the alveolus and the gum posteriorly about the level of the frænum of the tongue. The wound was dressed with styptic colloid, and the formation of the socket completed, when the lower canine was successfully implanted and ligated with silk. On August 12th, 1889, the patient writes to say that though he has worn the splint over six months the tooth is not firm and has "lost its colour."

Case XV. was that of N. A. G., a medical student, aged twenty-nine, and for whom several teeth were implanted. On December 13th, 1888, I extracted a very badly-decayed broken-down molar from the right side, the roots coming away separately, otherwise the condition of the operating field was quite healthy. The scion tooth was then extracted from the mouth of a young girl, aged fifteen, for the relief of an irregular denture. On examination the scion roots proved to be just about twice the length of the extracted roots, while, owing to the great curvature of the roots, they were stripped quite bare of pericementum in large places in the course of extraction. The operation of drilling the socket,

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especially that for the mesial root, was extremely difficult, principally from the fact that the operation had to be performed with a straight instrument. In consequence of the bulging shape of the scion tooth, it was necessary to disc the crown very considerably before it could enter the space. A small crown cavity and adjoining fissures were filled with amalgam, but the pulp was not removed. In consequence of the curve in the roots the socket had to be made rather unusually large, and, when removing the tooth at one of its final trials, it was seen that the blood mixed with the fresh débris of bone had formed a kind of stiffish paste, which seemed to have taken an exact impression of the roots of the scion tooth, showing a complete septum between the alveoli. It was determined not to syringe the socket out, the idea being that such a matrix must necessarily contain a considerable number of live bone-cells, and therefore be likely to form under favourable conditions new bone around the roots, this suggestion being based upon Dr. McEwen's experimental researches on bone implantation. The tooth had been kept moist in warm water only, and throughout the operation no special antiseptic precautions were taken beyond those of absolute cleanliness, the reason for that course of action being based upon the fact that it is not at all impossible that the drugs, such as mercuric chloride and others, which are employed to prevent the advent or the growth of micro-organisms, may be extremely detrimental, if not fatal, to the cellular life of the pericementum of the scion tooth. Since such an admission of wilful neglect of all possible antiseptic precautions may expose me to the adverse criticism of the advocates of strict Listerism, I may be permitted to mention two facts—firstly, that despite the numerous organisms found in the human mouth, any wound in the same is usually characterised by its healing more rapidly than in other parts of the body; and, secondly, that it is absolutely impossible to maintain strict antiseptic conditions in a case of an implanted tooth subsequent to the operation.

The tooth seemed to fit fairly firmly in position, therefore no splint or ligature was applied, and the edge of the wounded gum was simply dressed with styptic colloid.

About twelve days after the operation the patient remarked an increasing looseness in the tooth for a few days, accom-

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panied also, curiously enough, by a considerable amount of sensitiveness, a condition which he described as becoming chronic for a considerable time.

Eleven days after the operation Dr. Harrison, who kindly took charge of the case for me, reported that the tooth was very firm—in fact, as tight as any of the neighbouring teeth. There was no pain and the parts very healthy. Within two days, however, he noticed a certain looseness, and on the following day found the tooth extremely loose and a little tender.

When I saw the case again, about a month after the operation, the tooth was doing so well that nothing was done, but on his returning at the end of the second month, I found the tooth perfectly loose. I therefore drilled into the tooth and removed the contents of the pulp cavity, which were moist and extremely putrid. The pulp canals were syringed out with 1 per cent. solution ($Hg. Cl_2$) and filled with zinc oxychloride, with copper amalgam filling in the crown.

For this same patient I also undertook the experiment of implanting three contiguous teeth in the upper jaw to replace two broken-down, decayed, bicuspid roots and an absent first molar. On December 17th, 1888, on the extraction of the first bicuspid root, it was found to have a considerable abscessed sac formation contiguous with the thickened periosteum at the apex of the root. The left upper second bicuspid root presented no such formation. On the 19th the patient reported that he noticed yesterday a discharge from the socket or sockets of the extracted roots, and on examination on passing a probe into the second bicuspid socket it was found that it had passed into the antrum. A close examination of the gum over the long-since extracted molar seemed to present indications of the former position of its roots by slight depressions. It seems that about five years previously the crown had been fractured in the process of extraction, and that it was with great difficulty that the roots were separated and extracted. The tooth specially selected for this case proved unsuitable on trial. The operation was then postponed until the 19th, two days after the extraction, when I was compelled, in default of a better choice, to employ three teeth which I noted at the time as being "not all that could be wished," principally on account of the roots of the bicuspids

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being too long and the roots of the molar too divergent. The periosteum also only seemed to be perfect in parts here and there. The roots of all of them were prepared, as in the other cases, in the holder, and the crowns filled with amalgam. For the three teeth I am indebted to the courtesy of the house surgeon of the National Dental Hospital, but, unfortunately, without any details as to the age, &c., of the patients. Previous to beginning the operation the antrum was syringed with warm salt water. The molar implantation was begun by making a deep crucial incision (St. Andrew's Cross) over the site of the molar; the flaps thus produced were then pulled aside. In making the socket over the palatal root the drill, after but a very few turns, suddenly passed into a cavity, evidently that of the antrum. I thought I might have a better chance with the buccal roots, and therefore proceeded to prepare the distal buccal socket, but in this region the bone seemed to be even thinner. The antrum was also entered in drilling the mesial buccal socket. In adapting these to the scion roots it was found necessary to enlarge them into one cavity. A considerable difficulty was experienced in getting the molar into position, as either the buccal roots remained outside the alveolus while the palatal root was in position, or the palatal root of the others were in position. Finally, the intervening bone broke away in course of manipulation. This large cavity was then extended until the molar entered, but just as that was being completed a very sudden increased flow of blood took place, with marked pulsation, evidently showing that one of the smaller arteries had been severed. Digital compression failed to arrest the flow, so I endeavoured to force the tooth into its place. Happily, it fitted tightly, and in a short time the hæmorrhage was successfully arrested. In subsequently removing the tooth, to adjust it to the articulation, it was found that a matrix of blood and bone débris had been formed about the roots; this was allowed to remain, and the tooth finally adjusted after a final bath in 1 in 2000 solution of mercuric chloride. The excess of the flaps was trimmed with scissors, and the edges of the wound dressed with styptic colloid. The antrum was then thoroughly washed out through the bicuspid socket, first with warm water and then with a 1 in 3000 solution of mercuric chloride. After enlarging the sockets very considerably the second, and finally

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the first, bicuspid were adjusted and fixed without very much trouble, except that of adjusting their position and the articulation of their crowns. The second bicuspid was somewhat loose, but was held fairly tightly in position by the crown of the first bicuspid on the completion of the third implantation. In this case the flaps and edges were carefully washed with an antiseptic and dressed with styptic colloid.

The operation was of course a severe one for the patient, and although he was decidedly extremely nervous he stood it remarkably well, although his only preparation for the same was about a dram of the extract of coca leaves and about sixty minims of sal volatile. After the operation, on going home, he took ten grains of antipyrin, and a second and smaller dose on going to bed at night. On leaving he had only a sensation of an uneasiness and fulness in the left cheek, and no absolute pain.

With regard to the operation itself, the patient's own account, quoted from the diary of his case, is as follows:—"I did not think the pain very severe, but the nervous strain and irritation very exhausting, and I was quite prostrated by the time the implantation (the molar implantation) was finished. After a rest the two pre-molars were implanted, pain and discomfort being, of course, a good deal less than in the case of the molar."

The patient passed a fairly good night, in fact much better than the two previous nights, since he felt a considerable pain of a dull kind on the left side of the face for two days after the extraction. Two days after the operation the parts were dressed with styptic colloid, and a disarrangement of the implanted teeth corrected, and a ribbon splint applied which passed round the canine and second molar. The patient reported that he had had no pain, though a slight swelling of the face was noticeable.

On the following day, the 22nd, as the patient was returning to Brighton, I recommended him to place himself in the hands of Dr. Harrison, his former dental attendant, who reports on the case as follows:—"Dec. 24th.—Upper teeth in splint; phosphate cement much cracked and chipped; first bicuspid seems much displaced inwards and upwards. Splint firm, but interferes with bite on lower canine, which was corrected; parts generally healthy. Dec. 26th.—Splint

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broken yesterday; teeth are very much firmer; first bicuspid greatly displaced but firm; articulation of second bicuspid and first molar fairly good and very firm; fixed new splint with some trouble. Dec. 27th.—Phosphate cement breaking away from splint, therefore removed by patient in consequence thereof; teeth very firm and generally healthy; re-fixed splint with phosphate and gutta-percha base plate."

On Jan. 8th patient returned to Cambridge, when the old splint was removed. A model was then taken of the parts, and a half round gold wire splint, shaped on a metal die and fashioned somewhat after the style of a Hammond's wire splint, was substituted for the ribbon splint, which is certainly much too thin and frail for so extensive a splint as one including five teeth.

A few days after this the patient complained of a recurrence of a discharge from the left nostril, accompanied by a feeling of fulness, and slight pain of a dull kind.

On Jan. 15th, the upper molar slipped in a little further, coming quite clear of the opposing teeth, which caused some pain and inconvenience for the three or four following days. On Jan. 25th he reported that the discharge from the nostril had ceased. In his letter of that date he expressed a desire to have the molar replaced, but did not feel justified in risking it owing to his early departure for New Zealand.

On Feb. 8th I saw him for the last time. He reported that his health had remained sound, but that he had felt since the operation a general lowering of tone and want of energy, and occasionally a sense of irritation. Being a medical student, and therefore well acquainted with the anatomical relations of the parts, he was more apprehensive as to the possible results of the case than would have been an ordinary patient devoid of that knowledge. His trouble therefore during his last few weeks in this country was more mental than physical, and I trusted that by the time his voyage to New Zealand, which he was then undertaking, was complete, his anxiety would be entirely a thing of the past, as I think there can be no doubt that the period of danger had been successfully passed previous to his departure; even although all of the implanted teeth should be lost.

The patient promised to send me a report on his case for this meeting, but it has not come to hand. His mother

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writes to say that the delightful voyage has restored her son's health. His letters are cheerful, though he has broken his collar bone. His only remark about his teeth was one made in May, that they had been a terrible anxiety.

Case XVI. was that of G. S., a healthy but rather nervous young man, aged twenty-five. This case was a somewhat peculiar one, since although his teeth generally were largely decayed in the ordinary situation of caries, nearly all the front teeth were largely decayed over the whole palatal surface as a result of wearing a cheap (three teeth 12s. 6d.) vulcanite plate. He had worn the plate constantly for about four and a-half years, and cleaned it when it wanted it—namely, about once a month or so. At first he did not remove it so often as that, since he was directed not to take it out at all by the—well we cannot call him dentist, let us say—manufacturer. All the surfaces touched by the teeth were considerably affected, but more especially the central incisors, right lateral incisor and both the canines. The first indication of treatment was evidently the disuse of the plate, to which the patient readily consented despite the deficiency caused by the absence of the left upper lateral. After the numerous fillings had been completed and a healthy condition of the mouth thoroughly restored it was determined to replace the absent lateral by implantation. As his lower incisors were extremely crowded and irregular it was determined to extract the right lower second incisor and to employ that as the scion tooth, which was successfully done on the 11th February, 1889. The condition of the opening field was healthy but very much absorbed; while the periosteum of the scion tooth was stripped off in several places. The pulp was not removed, and an interval of barely twenty-five minutes elapsed between the period of its extraction and implantation, during which time it was kept in clean warm water without the addition of any antiseptic agent. No splint nor ligature was necessary. About five days subsequent to the operation the patient complained of great pain in the implanted tooth; the gum was swollen and inflamed. After applying a 50 per cent. solution of cocaine hydrochlorate to the gum an hypodermic injection was made of antipyrin one grain and nine grains administered internally. This, as was anticipated, led to an immediate increase of the pain; in half-an-hour, however, the patient left with the pain entirely relieved.

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On March 7th it was evident that there was an abscess formation at the root of the implanted tooth. This was lanced and the pulp cavity trephined and the pulp removed.

About May 7th the patient noticed the formation of a fistulous opening on the labial surface of the gum without any pain.

A few days afterwards he consulted me about this, when I found that although there was not much pus on pressure there was a considerable abscessed cavity at the apex of the root. This cavity was thoroughly opened and syringed with Kingzett's solution diluted with peroxide of hydrogen. Two or three similar dressings were subsequently applied, and in July 24th the patient presented himself for examination, when the fistulous opening was found to have completely closed. The tooth at present presents very much the same condition that it has all along, namely, that it is steady but moves on pressure; it never has presented that rigidity which has characterised most of the other operations.

Summary of Cases (Second Series).

In all eight cases with fifteen implantations; of these five teeth in two cases have failed in two, five, eight and twelve months, while two teeth in another case will possibly be lost ere long. In one case of four implantations there is no report. Most of these cases were unpromising soon after the operation—either from lack of proper attention, from unfavourable conditions in the field of operation, or from the subsequent degeneration of the pulp. In eight teeth the pulps were not removed. Of these only one has possibly retained the vitality of the pulp, while in seven the vitality was lost. Subsequent removal of the pulp may be delayed too long. Three such implanted teeth have been already lost, and at least two are known to be unsatisfactory. Despite the short interval of time between extraction and implantation, varying from twelve minutes to an hour, it is evident that the effort to retain the vitality of the pulp is contra-indicated, though it is permissible to postpone the removal of the pulp till the scion tooth is in position, with a view to rescuing the periosteum from the dangers of manipulation in filling the tooth out of the mouth.

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TABULATED ABSTRACT OF CASES OF IMPLANTATION (Second Series).

No.	Name.	Age.	Sex.	Tooth.	When lost.	Conditions of Operating Field.	Operation.	Scion Tooth.	Age.	When Extracted Day.	When Extracted Hour.	Preparation of.
9	R. E. T.	24	M.	R. U. B_1	Some years	Gum healthy, absorption of alveolus complete	Making artificial socket	L. U. B_1	16	24. ix. 88.	12.10 p.m.	None
10	A. T.	23	M.	R. U. I_2	2 days	Chronic gingivitis with swollen interdental papillæ, long neglected mouth, fistulous opening (from R. U. I_1 or I_2?)	Enlarged and widened socket in its whole extent	R. U. I_2	19	31. viii. 88.	3 p.m.	Root canal dressed with Hg Cl_2 (1 in 2000) and filled with zinc oxychloride; Crown 2 G stoppings
	,,	,,	,,	L. U. B_1	2 days	,, ,, (fistulous opening)	,, ,,	R. U. B_1	13	28. viii. 88.	4 p.m.	Ditto; Crown A stopping
	,,	,,	,,	L. U. M_1	4 days	Chronic gingivitis, &c.	,, ,,	L. U. M_1	15½	3. ix. 88.	5.30 p.m.	None
	,,	,,	,,	R. U. M_1	4 days	,, ,,	,, ,,	R. U. M_1	15½	3. ix. 88.	5 p.m.	Pulp not removed. A stg. in crown after implantation
11	A. E. M.	20	M.	L. L. M_1	Day of implantation	Gum healthy round the two small roots	,, ,,	R. L. M_1	15	13. xi. 88.	—	Usual root canal treatment and A stg. in crown
12	B. P. H.	20½	M.	L. U. I_2	Previous day.	Abscessed with palatal swelling	,, ,,	L. U. I_2	17	17. xi. 88.	11 a.m.	Pulp not removed
13	P. W.	20	M.	R. U. I_1	Several years	Gum healthy, absorption complete. Thin alveolar process	Making artificial socket	R. U. I_2	12	8. xii. 88.	3 p.m.	None
	,,	,,	,,	L. U. I_1	,,	,, ,,	,, ,,	L. U. I_2	12	8. xii. 88.	3 p.m.	,,
14	O. P.	22	M.	L. L. I_2	Day of operation	Healthy	Making new socket between those of two freshly extracted teeth	L. L. C. (his own)	22	12. xii. 88.	Noon	,,
15	N. H. G.	29	M.	R. L. M_1	Day of operation	Healthy; sockets about half the length of scion roots	Enlarged and deepened sockets into one cavity	R. L. M_1	15	13. xii. 88.	11 a.m.	Crown cavity, A stg.
	,,	,,	,,	L. U. B_1	2 days	Gum healthy, abscess sac on extracted root, alveolus considerably broken from difficult extraction	Socket considerably enlarged	L. U. B_1	?	18. xii. 88.	10 a.m.	Root canal and pulp cavity filled from the crown in holder Hg Cl_2 1% zinc oxychloride and A stg.
	,,	,,	,,	L. U. B_2	,,	Gum healthy, no abscess sac on extracted root, pus discharge from socket day after extraction, on probing socket probe passed into antrum	,, ,,	L. U. B_2	?	18. xii. 88.	,,	,,
	,,	,,	,,	L. U. M_1	5 years	Gum healthy, alveolus largely absorbed	Making artificial socket	L. U. M_1	?	18. xii. 88.	,,	,,
	G. S.	26		L. U. I_1	7 years	,, ,,	,, ,,	R. L. I_2 (his own)	26	11. ii. 89.	1 p.m.	None—4 weeks after usual treatment as above

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No.	Condition of Periosteum.	How kept.	Interval of time.	How fixed.	Complications.—Results.	Remarks.	Last seen.
9	Only partially covered	Hg Cl_2 (1 in 1000)	¾ hour	Metal splint, phosphate cement	Cement (Weston's—fresh packet from Depôt) never set properly, and crumbled away. Within 2 days the splint came away	"Tooth never firm,"—Pulp removed and root canal treatment in Oct., and tooth removed by patient in Dec. Absorption of roots	Lost.
10	Very much stripped	Hg Cl_2 (1 in 2000)	25 hours	,,	.....	.....	Extracted 7. viii. 89. (much absorbed).
	In patches and stripped on l. and d. surfaces.	Hg Cl_2 (1 in 2000)	4 days	No splint nor ligatures	Immature scion tooth with wide apical foramina	.....	Extracted 30. iv. 89.
	Greatly stripped but tips fairly invested	Hg Cl_2 (1 in 2000)	12 minutes	,,	.....	.....	Extracted 11. i. 89.
	,,	,,	20 minutes	,,	Jan. 11th, 1889—Root canal treatment. Aug. 7th, 1889—Scion tooth quite necrosed, had recently caused abscess, considerable flow of pus on pressure, slight absorption at apices	.....	Extracted 7. viii. 89.
11	Greater part of roots covered	,,	30 hours	,,	Aug. 16th, 1889—Scion tooth very firm and freely used	.....	16. viii. 89.
12	From twist in scion root, mere traces	Water	½ hour	Metal splint, phosphate cement	The bone at upper part of socket was largely excavated palatally from the abscess formation	"As firm as any of my other teeth"	8. viii. 89.
13	Partially stripped	Warm water	1 hour	Silk ligature	Feb. 11th, 1889—Extremely loose, fistulous opening, pulp removed and root filled, attachment broken in operation, tooth removed (upper part considerably absorbed, lower devoid of pericementum), replaced and ligatured	"Still in position but loose"	24. vii. 89.
	,,	,,	1 hour	,,	Feb. 11th, 1889—Not so loose, pulp removed and root filled, &c.	,,	,,
14	,,	Water	1½ hours	Silk ligatures, then metal splint next day	Scion tooth, long tapering twisted root. In burring new alveolus patient caused instrument to swerve, perforating the alveolus and gum posteriorly about the level of frænum of tongue	"Splint retained for 6 months; implanted tooth is not firm and 'has lost its colour'" Aug. 12th, 1889.	
15	From curvature of roots, stripped quite bare in large places	Water	¾ hours	No splint nor ligature	On removing the scion from socket, the blood and bone débris formed a septum between the alveoli, the socket was not syringed out before final implantation	Feb. 8th, 1889—Scion loose, pulp putrid, usual root canal treatment and A stg.	No news, patient in New Zealand
	Large bare places	Hg Cl_2 (1 in 2000)	30 hours	Ribbon splint applied on second day	Scion tooth not all one could desire, and roots much too long	.....	,,
	,,	,,	,,	,,	Ditto; and antral perforation	.....	,,
16	Small patches here and there	,,	,,	,,	Ditto; and too divergent. Large perforation into antrum	.....	,,
	Stripped in places	Warm water	25 minutes	No splint nor ligature	Great pain about 1 week after operation, 4 weeks later abscess formation lanced, pulp removed, 3 months later fistulous opening, and after 6 months no fistula	.....	24. vii. 89.

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General Summary.

1. The operation is still promising.

2. Great absorption of the alveolus, from its necessitating the leaving of but a thin layer of bone on the labial aspect, is a barrier to successful implantation.

3. The pulp should be removed at latest soon after the implantation.

4. The "mortality" seems greatest amongst young scion teeth.

5. It is desirable to ascertain the possibility of the successful implantation of unabsorbable roots which must necessarily be artificial and furnished with sponge grafts or carbolised gut leaders to promote bony attachment.

6. Nothing has as yet occurred to upset or even modify the general conclusions arrived at in the first paper.

Obligations.

To Professor Roy for use of pathological laboratory, &c., To Messrs. Baldwin, Baker, Balkwill, Corbet, Gabriel, Gartrell, Howarth, Jones, O'Connor and Rhodes for kindly furnishing me with teeth suitable for implantation.

Iodoform: Its Action and Uses in Dental Surgery.

By R. DENISON PEDLEY, F.R.C.S.Ed., M.R.C.S., L.D.S.

Iodoform is prepared by the action of iodine on a hot solution of carbonate of soda or potash in diluted alcohol. This substance is chemically allied to chloroform, and is in the form of yellow crystalline scales, and as a very fine powder.

It is soluble in ether, chloroform, rectified spirit, eucalyptus oil and collodion in varying proportions. When heated iodoform turns brown in colour, becomes liquid, sets free a violet-coloured vapour, and leaves a black residue, which disappears on continuous ignition. Iodoform is not readily decomposed, except by heat,

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and sparingly so in solutions of ether and alcohol. Whenever decomposition takes place the colour changes from light yellow to very dark brown, and iodine is set free.

Free iodine can always be detected in any preparation of iodoform by mixing with a small quantity of starch paste; the colour of the latter will be changed from a light blue to a deep purple. Iodoform is a powerful antiseptic and deodoriser. It is largely used in general surgery, in fine powder dusted over wounds after operations, syphilitic sores and foul and indolent ulcers. Iodoform wool is used instead of, or in combination with, Listerian dressings.

Though containing nine-tenths of its weight of pure iodine, iodoform is not an irritant like iodine, either applied externally or taken internally. So unirritating is this drug that it has been dusted over the conjunctiva in cases of purulent conjunctivitis, and freely applied to the peritoneum after abdominal section with marked benefit. It is highly valued by surgeons for its antiseptic and soothing qualities, and for the remarkable effect it has in preventing putrefaction.

Iodoform is one of the most useful drugs which the dental surgeon can possibly have to deal with in his endeavours to keep the mouth in a healthy condition. The gravest objection which can be urged against its use is the disagreeable perfume. That you may mask, but cannot altogether conceal. It is at any rate a healthy odour, and far preferable to many which emanate from the oral cavity.

We propose to point out briefly: (*a*) Those affections of the structures outside the teeth where iodoform has proved beneficial. Then to consider (*b*) The effects of iodoform on the pulp living or dead.

(*a*) 1. Unhealthy wounds, such as may be seen at times after the extraction of a tooth, where the edges of the gum are congested, swollen and everted, small greyish sloughs being thrown off, the patient meanwhile complaining of constant pain. Here we would remark, in passing, that this condition may be induced by the use of dirty instruments, though we have more frequently seen it in patients who are either alcoholic or anæmic.

2. Pyorrhœa alveolaris, that mysterious disease which attacks the alveolar margins, and in which with more or less discharge of pus round the necks of the teeth the sockets dissolve away.

3. Ulcerative stomatitis, which occurs so frequently among the children of the poor, affecting the margins of the gums and the

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mucous membrane of the cheek, as if they were poisoned by constant contact with foul discharges and carious teeth.

4. Necrosis of alveolar margins, whether due to syphilis or the mercury taken for its cure, to an extension of alveolar abscess, or the result of debilitating fevers, as measles and scarlatina.

In such cases we have found iodoform useful as a remedial agent, and as a sedative in relieving pain, promoting healthy discharges, healthy granulations, and the rapid healing of parts.

The most convenient forms are: a saturated solution of iodoform in ether or eucalyptus oil; equal parts of iodoform and tannic acid; iodoform in fine powder. These can be applied with a camel's-hair pencil, or with the simplest form of syringe, viz., that of a glass tube, small and of fine calibre at one end, with an ordinary rubber teat fixed to the other.

(*b*) In the course of removing decay from a tooth (which previously has not been painful), we sometimes expose the nerve, either in an endeavour to take away all unhealthy tissue, or in our conscientious desire to shape the cavity for the reception of a filling. Supposing it to be a mere pin-hole exposure we may cover with court plaster, and avoiding pressure feel pretty sure that the tooth will give no further trouble; but it is far otherwise if the exposure is large and the surrounding dentine soft. The usual treatment recommended is to mix a small portion of oxide of zinc with oil of cloves, place over the pulp, over this a concave disc of metal, the edges of which shall come well on to the sound dentine. This method we have long discarded for two reasons: (1) because the patient was often subjected to much pain necessitating the removal of the filling and the destruction of the nerve; (2) if no pain followed, the pulp was frequently found dead and almost invariably putrid, the first intimation of the same being an alveolar abscess of acute type.

When we have filled a small concave disc of metal with iodoform, as a substitute for the oil of cloves and zinc, our experience has been entirely different. The sedative action of iodoform has, in the majority of cases, prevented further trouble, and the remarkable effect iodoform has in preventing putrefaction shows itself in the following manner. When the nerve has for some unknown reason lost its vitality, we have never found it in a state of putrefaction. It has been mummified or moist, but perfectly sweet and smelling strongly. We have been enabled to treat large numbers of exposed nerves by means of this drug, where

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without it we should unhesitatingly have proceeded to destroy them and treat the teeth as pulpless.

After destroying the nerve of a tooth by means of arsenic or any more immediate method, our first efforts are directed to its removal from the pulp chamber and the nerve canals. If this can be properly carried out the choice in number and efficacy of root-fillings is considerable, for here we have healthy roots to deal with, and it matters little whether we use gold or wooden pegs, oxychloride or leaden points, gutta percha or asbestos fibre, so long as they are properly introduced; but all are very well aware that there are many cases where one finds it impossible to remove the contents of the nerve canals, and in such iodoform should be placed either at the orifice of a canal or in close contact with that part of the devitalised nerve which remains. Should there be any doubt as to any considerable portion of the nerve being left behind, it is a very safe practice and better by far to fill the pulp chambers with iodoform than to use cotton wool soaked in carbolic, creosote or any of the essential oils, as these fluids become absorbed, and when the pulp chamber is opened up later on the cotton is stinking.

We shall here mention two cases in practice which may not be altogether uninteresting, on account of a somewhat unusual method of procedure.

Dr. G., a busy medical practitioner, sought advice. He was suffering from severe toothache. On examination the pain appeared to proceed from the six-years-old molar in the upper jaw, right side. There was a large cavity on the median surface extending to the gum line, and the pulp which was exposed was acutely inflamed. As time was a consideration, and the patient was loth to lose the tooth, nitrous oxide gas was administered. With the aid of a Shaw's engine a rose-headed drill was run into the pulp, and a small pledget of cotton dipped in carbolised resin was introduced. In a few minutes all pain had ceased. The cotton was removed and the pulp chamber was filled with iodoform paste, over it a metal disc, and the cavity in the tooth filled with a permanent gutta-percha filling. Two years have elapsed, and though we have had the opportunity of examining the tooth at intervals, no trouble has necessitated the removal of the filling.

Mr. N. came to have a tooth stopped—an upper wisdom tooth on the right side. On the labial (outer) surface a large cavity was found. The tooth had not been at all painful. There was no

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sign of an exposed nerve, and after carefully excavating the cavity we filled it with a Sullivan's amalgam.

In less than an hour the patient returned. He was in an agony of pain, the tears rolling down his cheeks. The filling—not yet hard—was removed at once, and on careful examination a minute speck in the centre of the cavity clearly pointed to a pin-hole exposure. Notwithstanding the application of carbolic, creosote and other drugs, the pain continued as acutely as ever. Gas was administered and the same procedure was adopted as mentioned in the first case. Two years and four months have passed away, and last week we examined the tooth, which has been perfectly comfortable. We received with meekness a kindly hint from our patient that a repetition of the above was not desirable.

When the nerve of a tooth has passed into a state of putrid decomposition the uncertainty is great as to its future usefulness. Most practitioners are agreed as to the *advisability* of removing all decomposition from the pulp chamber or nerve canals; but the root filling is a matter of some controversy. It seems essential that the filling shall be permanently antiseptic and capable of being easily removed. We find by long experience that iodoform answers the purpose well.

To obtain the full advantages of iodoform it is necessary to use the drug in a concentrated form, and we recommend the following preparations :—

Iodoform Paste.—Oil of eucalyptus, 20 minims; oil of cloves, 30 minims; creosote, 100 minims.

Into this gum mastic is dissolved to saturation. After filtering through cotton wool the solution should be incorporated with Iodoform until the whole becomes a solid mass.

This preparation is always moist and (used with wisps of cotton) is a good permanent root filling for chronic dead teeth, and forms an excellent capping for exposed nerves under a concave disc of metal.

Iodoform Cement.—Iodoform in fine powder, and strong tincture of benzoin; mix into a thick paste.

This preparation should be kept in a wide-mouth stoppered bottle to prevent evaporation.

When mixed with fine cotton on a glass slab it forms an excellent root-filling for healthy teeth, and sets quite hard. It can also be used as a floor in very sensitive teeth under a metal stopping.

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Iodoform Points.—These consist of thick floss silk or cotton thoroughly saturated with iodoform cement, and when dry cut into short lengths and put by for future use as permanent root fillings.

Demonstrations.

Given at the Brighton Dental Hospital, Queen's Road.

Dr. F. HEWITT, M.A., demonstrated the use of the mixture of oxygen and nitrous gas; about 100 were present. Five cases were undertaken to illustrate his method—in each case the patient was thoroughly anæsthetised—and passed off very successfully. Mr. Walter Harrison (Brighton) operated in four cases and Mr. G. Brunton (Leeds) in one.

At the close of the demonstrations Dr. Hewitt again explained the method and apparatus, which was received with loud and prolonged applause.

Mr. G. BRUNTON (Leeds) demonstrated the "Howard" or extended method for extracting under the deeper anæsthetics. Dr. Hewitt administered gas and ether. Being somewhat late in the morning the majority of the members had left for the Royal Pavilion. Those who witnessed the operation expressed great satisfaction.

Dr. BONWILL (Philadelphia) demonstrated "Rapid Breathing;" the room was crowded to excess, but the patient failed to arrive at the stage of unconsciousness, and was referred to the room below and received the oxygen and gas mixture.

At the Royal Pavilion.

Mr. W. HERN.—Porcelain inlaying, cutting his own plugs. Operations were conducted both in the mouth and on models. Mr. Hern's method was warmly received, and excceded other styles in neatness.

Mr. T. MANSELL (Birkenhead), filled an approximal cavity making cohesive contour filling.

Mr. MAXWELL (Hastings).—Cohesive contour (automatic mallet) mesial left central.

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Mr. C. B. STONER.—Immediate root filling.

Mr. J. H. GARTRELL showed some specimens of his moveable bridge work.

Dr. BONWILL.—The use of smooth oval-pointed pluggers in both electric and mechanical mallets, as well as any cohesive or non-cohesive foil; also his dental engine. Dr. Bonwill interested his audience with dental conversation.

Mr. C. A. HAYMAN showed his interesting and unique case of artificial palatal and facial restoration, which was highly appreciated.

Mr. G. CUNNINGHAM showed a case of implanted upper bicuspid which was quite firm and a successful operation performed nearly two years ago.

Mr. W. HARRISON filled a crown cavity in an upper molar with William's Crystalloid Gold, using mainly hand pressure and finishing with round pluggers and Abbott's mallet, and using Campbell's horizontal engine (the driving wheel being under the chair—a great help with nervous patients), and Sperling's wool pads; also showed a simple matrix made from Brown's polishing strips and fixed with a piece of amadou or wood.

Mr. Harrison also explained the gold and porcelain crowns made by Messrs. Lennox, J. H. Redman, G. Cunningham, D. E. Caush, J. H. Watford and himself, which included specimens of the Buttner and Balkwill systems.

Messrs. JONES and LENNOX filled an approximal cavity with gold, using the Thomas and Lennox pneumatic mallet. They also demonstrated the following method of constructing and inserting a bridge to carry four teeth, viz., two centrals and two laterals—the lateral roots supporting the bridge.

In the accompanying drawings:—

Fig. 1 shows a vertical section through the two root-canals, giving an inside elevation of the bridge in connection with the posts.

Fig. 2.—An outside elevation of the two centrals and the outer backs of the laterals.

Fig. 3.—A vertical section of a lateral when mounted.

Fig. 4.—A similar section of a central in contact with the gum.

Fig. 5.—A section through post, inner back and ring of a lateral before mounting.

Fig. 6.—An inside elevation of the same.

Fig. 7.—A horizontal section of the work when finished.

At the outset the lateral roots were prepared and a cast was taken and treated exactly as described in the first paragraph of

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the account of a method of crowning roots in the July number of the BRITISH DENTAL ASSOCIATION JOURNAL, page 495. Four flat teeth were then chosen of such size that, when the work was finished, adjacent teeth just touched each other at one point, the purpose of this being to prevent the junction of their backs from being visible in the mouth. These teeth were ground to the

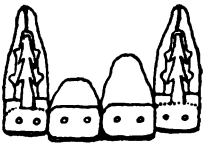

Fig 1

Fig 2

Fig 3.

Fig 4.

Fig 5.

Fig 6.

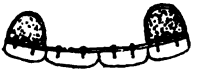

Fig 7.

model and fitted with backs, which were kept quite short towards the gum. This may be done because the backs are not to be soldered to a plate, and there is an advantage in point of cleanliness in reducing the amount of metal as much as possible. The centrals were then permanently riveted to their backs. A second back was next prepared for each lateral, and these were made of the usual shape. The two backs of each lateral were then temporarily secured to it by slightly bending the pins, and bands were prepared and fitted to them and to the roots as described in the second paragraph of the paper above quoted. A pin (or post) for each root was also prepared as there described, and soldered, in this instance, to the inner of the two backs, the same precautions being observed as to adjustment, &c. The next step was to wax the two centrals and the two laterals with their outer backs only in position, upon the model. Then the whole being carefully removed and invested in sand with a slight addition of plaster, the backs of the two centrals were soldered to their pins, to each other, and to the (outer) backs of the laterals. The work was then finished in the usual way and tried in the mouth.

Up to this point the operations had been carried out in the workshop. The process of insertion was demonstrated at Brighton.

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The first step was to attach the inner backs and bands of the laterals temporarily to the outer backs by means of small staples of soft wire, of the same thickness as the pins of the teeth. This was done by putting the staples in from the back and bending the outer ends. The posts were then fixed in the roots by means of white-stopping, the post on the right side of the mouth being first fixed. The staples were then removed, a small quantity of soft copper amalgam was applied to the parts of the roots in front of the backs, the lateral teeth were put in, the pins which then passed through both backs of the laterals were bent towards the gum, and the bridge thus firmly fixed in position. Finally the bands were filled up with copper amalgam and finished as described in the July number of the Journal.

This completed the work.

The advantages of this method of bridging arise from the small quantity of metal used, the consequent cleanliness, lightness and smallness of bulk of the work, allowing its use in all cases where flat teeth can be applied at all, and the readiness with which the work can be removed and repaired in the event of a fracture; the removal being made by drilling out the amalgam and straightening or, if need be, cutting the pins.

The patient to whom this work was applied had been wearing a gold plate carrying two centrals, and his laterals were too far gone to admit of further gold filling.

Mr. C. F. Rilot filled two inferior molars, illustrating the soft and hard methods of gold filling. His skilful manipulations cannot be described in print, but were none the less very interesting to those who witnessed them.

Mr. Coxon showed his new gas union.

Mr. Charters Birch showed a new electric engine.

A demonstration on hard section cutting, staining, and mounting was given by Mr. D. E. Caush, L.D.S.I., assisted by Messrs. A. Burt, T. Channing, D. Gabell, W. Gabell, T. Naylor, and W. Wood. The method shown was that suggested by Mr. T. Charters White in the British Dental Association Journal, and was as follows. The tooth, "if either a longitudinal section was required or a section showing enamel," was ground down on a lathe, or if a transverse section of the root was required the latter was sawn off with a fine saw, as thin as possible; if necessary it was then mounted on a piece of wood by means of a little softened shellac, the section being pressed into the shellac, and when cold

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it was either ground or filed as thin as possible. The section was then taken and placed between two pieces of ground glass with a little pumice powder and plenty of water, while with a rotary motion of the upper piece of glass, the section being constantly turned over, until it became very thin. This was then placed between two pieces of glass that had been well used, and with very little pumice and plenty of water the rotary motion is continued until the section is thin enough. The worn glass produces a somewhat polished surface; it is then thoroughly washed in water, and afterwards in distilled water. If there is any exostosis, or it is thought desirable to stain the membrane, the section is placed in an aqueous solution of aniline dye and allowed to remain for a few minutes. Whilst the section is in the dye take a glass slip and a cover glass; clean each and see that no dust remains on the surface of either. When they are cleaned take a small quantity of hard canada balsam, warm the glass and place a small quantity of the balsam on the slip, also place a little on the warm cover glass. Now take the section out of the dye and drain it, then place the section in the palm of the hand, and with one of the fingers of the other hand rub the surface of the section so that the surface water may be removed whilst the tubuli, canaliculi, &c., remain filled with the solution; mount in the balsam in this condition so that the structure may be well shown.

To mount the section place it in the centre of the balsam on the slip, then place the cover glass on warm and gently press down and if necessary keep under pressure until the balsam sets. When the balsam is hard it is cleared off with any of the solvents (chloroform, benzole, methylated spirit, &c.), and when it is cleaned the slide is ready for putting on the ring of cement. This is done by centering the cover glass on the turn table, and whilst the slide is rotating touch the edge of the cover glass with a camel-hair brush charged with Aspinall's enamel. This gives a finish to the slide and also prevents the edge of the cover glass from being chipped. The advantages of the enamels are, they dry quickly, can be obtained in almost any colour, are always at hand, are not affected by moisture, and do not leave the glass if there is any concussion.

The demonstrations were intelligently carried out, each of the gentlemen manifesting a desire to give the interested visitors every opportunity of thoroughly understanding the various stages of the proceedings.

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